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THE ROLE OF TENDON TRANSPLANTATION IN THE RESTORATION OF FUNCTION FOLLOWING PARALYSIS.[1]

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IN this paper I have taken as my basis the work done in Brisbane on paralysis following anterior poliomyelitis.

Muscles act in two ways: (i) statically to hold position and maintain balance; (ii) by upsetting position and balance to produce movements.

The body is a well-balanced reciprocal engine. Any imbalance of muscular action in reciprocity interferes with efficiency and increases wear and tear. Later on deformities tend to occur, and strain is increased with its resultant effects of arthritis *et cetera*.

The discussion tonight considers how far we can restore function of the different parts of the body or even the whole of the body by transplantation of tendons.

The uses of tendon transplantation are given by Sir Robert Jones (Jones and Lovett, 1929) under three headings:

(1) To restore the balance between opposing groups of muscles by helping to distribute the power.
(2) To prevent or correct deformity.
(3) To improve stability in conjunction with operations such as astragalectomy, arthrodesis, tendon fixation, or the use of artificial ligaments.

This classification of the uses still holds good.

[1] Read at a meeting of the Australian Orthopædic Association held at Sydney from June 1 to 4, 1949.

The operative technique and various points to be observed are dealt with in discussion of the different types of transplantation.

In all cases, we should be able to justify the operation.

Of great importance is a knowledge of functional or living anatomy, especially as applied to muscles.

One should have the knowledge and ability to assess the condition as regards power and function of the muscle or muscles that have suffered from paralysis and the state of the muscle it is proposed to transplant.

Muscles are constructed according to their function. Those with a proportionately large amount of muscle tissue present and little fibro-elastic tissue are usually made for strength, as in the extensors and abductors of the hip joints. These muscles are not very suitable for transplantation but can be used with free graft of *fascia lata* or tendon, as later described in transplantation of the trapezius. Those with long fascial or tendinous insertions appear to give the best results when return of movements is required. They work on a system of levers, and we can, in certain cases, alter the leverage and thus improve the efficiency of the transplanted muscle.

In a specific movement certain muscles are linked up in a pattern which is represented in the central nervous system. Any interference with this pattern by paralysis causes upset and disorganization of movement. In transplantation we should endeavour to use for motive power a muscle which has a link-up, however, small, within this pattern of movement. A good example is the invariable contraction of the *palmaris longus* and *flexor carpi ulnaris* when opposition of the limb is attempted.

In my series of cases I have noted that certain muscles of the body appear to escape paralysis more than others: at the hip joint, the *tensor fasciæ latæ*, and in the hand the *palmaris longus*.

Choice of Muscle for Transplantation.

In anterior poliomyelitis, paralysis or paresis of muscles is patchy. In a limb it is rare to find one muscle paralysed side by side with muscles with full power which can be used for transplantation.

Partially paralysed muscles have often to be used; and we are justified in using them, if, by such an operation, we can do something to improve the function of the part in balance, position or movement.

For this reason, it is difficult to compare the results in these cases and those in which paralysis has been due to trauma.

When to Operate in the Course of the Disease.

If suitable treatment can be given to prevent deformities, sufficient time should be allowed to determine what amount of recovery of affected muscles will take place. In children adaptive shortening of soft tissues and, with growth, bony changes occur very early; functional deformities rapidly become structural. Muscle transplantation is not satisfactory at an early age. The child is not muscle or movement conscious before the age of four or five years, and reeducation is very difficult.

If there is any deformity of the part this must be corrected before transplantation can be carried out.

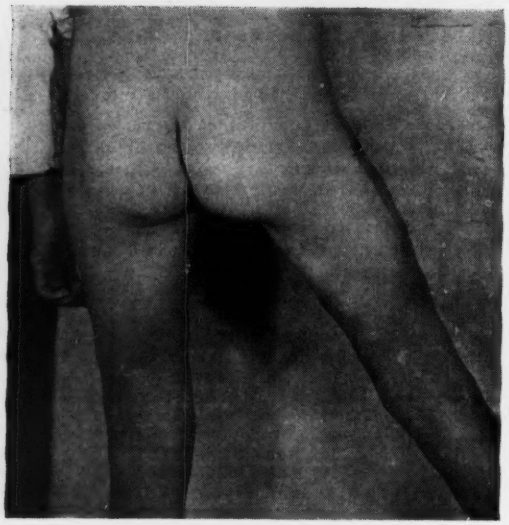

FIGURE I.

The Requirements of Different Joints.

In planning the operation one should take into account the requirements of the different joints.

Hip Joint.

Extension and abduction are two essentials for the hip joint to allow of stability and movement. A limb can be satisfactorily used if these two are available. Flexion and adduction are not essential.

Knee Joint.

For the limb to be functional at the knee joint the locking action in extension must be intact. The extensors of the knee play a very small part in this. I have seen a number of patients whose quadriceps was completely paralysed who could stand and walk in a very satisfactory manner. What is essential is that the knee should be able to lock against sufficiently powerful hamstrings to prevent a *genu recurvatum*. I am not in favour of any operation which sacrifices the hamstrings to buttress up the power of extension of the quadriceps.

The Foot.

In cases in my series involving the foot, transplantation of tendons has not played a great part in rehabilitation, except associated with some type of stabilizing operation. Shifting of tendons on the dorsal aspect can be used to correct balance.

Upper Limb.

When the upper limb is concerned, free mobility in the hand is essential. At the shoulder joint, as well as movements, the most important of which is abduction, muscular support of the limb on the trunk is necessary to prevent deformities of the spine.

Operations Performed.

Hip.

In one case of complete paralysis of the *gluteus medius*, the fascial insertion of the *tensor fasciæ latæ* was pulled through a fairly wide bony tunnel at the base of the greater trochanter. The child now has good control of the limb in walking and standing.

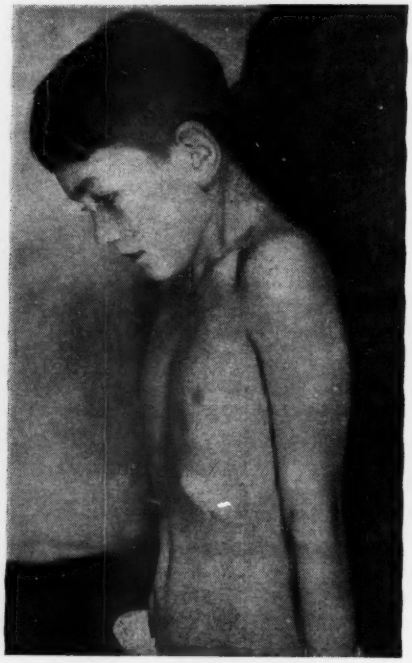

FIGURE IIA.

Abdomen.

Free fascial grafts in unilateral paralysis of the abdominal muscles were used in two cases. The patients had gross weakness and had developed to postural scoliosis. They were operated on on October 14, 1946, and February 25, 1947, respectively, according to the technique described by Professor Lowman (1931). On recent examination both patients have the spine well balanced. The abdominal muscles have shown some return of power and the fascial grafts have thickened. This operation should be considered as a form of internal splinting and should be performed early to prevent imbalance of the body.

Knee Joint.

In no case have I used the hamstrings to aid extension. In two cases the fascial insertion of the *tensor fasciæ latæ* was stripped from the shaft of the femur for a hip flexion deformity, according to the technique of Fitchett,

and then was inserted into the quadriceps and upper border of the patella. Results were satisfactory. Two free fascial grafts were used for extreme cases of *genu recurvatum*. The free graft of *fascia lata* was inserted into a bony tunnel through the upper and inner aspect of the tibia and hooked around the insertion of the *abductor magnus*.

The knee was kept in flexion for about two to three months. The *genu recurvatum* has been corrected in both cases.

Feet.

In three cases the *peroneus longus* was transferred to the inner side of the foot to take the place of the paralysed *tibialis anterior* muscle. The transplanted tendon was

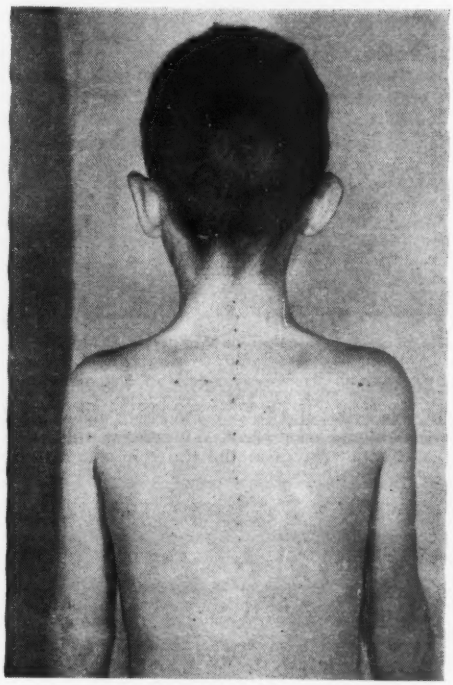

FIGURE IIB.

brought through the subcutaneous fat; the tendon was stripped well up the leg and taken direct to its insertion into the dorsum of the foot.

In one case the result was very satisfactory. In one case over-correction occurred and the tendon had to be brought back more to the centre on the dorsum of the foot.

In one case slight over-correction occurred and the patient has to wear an adjustment to the shoes. I have found a tendency for over-correction if the tendon is fixed too much to the inner side.

The *peroneus tertius* was used with good results in one case.

Shoulder.

Four patients had complete paralysis of the deltoid. Most of these had paresis of the posterior scapular muscles, one complete paralysis except for the upper fibres of the trapezius. None of them had any movement in abduction at the shoulder joint. All were developing postural scoliosis. According to the technique of Leo Mayer (1927), with some modifications, I have transplanted the trapezius after separation from the acromion and clavicle. A free graft of *fascia lata* was used to prolong the motive power. It was also wrapped around the raw surface of the muscles. The grafted fascia was fixed into a tunnel in the humerus one inch from the head. All patients are able to support the arm in the vertical plane. Three have fair return of movements. Two can raise the limb to a right angle. None has developed scoliosis. In the case in which there was extensive paralysis, little movement is possible, but the limb is well supported. Arthrodesis in most of the cases would not have given satisfactory results owing to weakness of the posterior scapular muscles.

Hand.

One child had paralysis of the *flexor profundus* of the middle and ring fingers with much looseness and atrophy of the tips of the affected fingers. The inner strand of

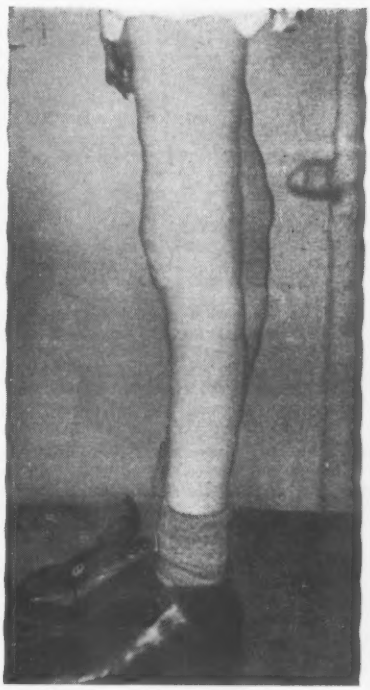

FIGURE III.

the *flexor sublimis digitorum* was detached from its insertion and separated well up. It was then fastened into the tendons of the *flexor profundus digitorum*. Movements and control of the fingers are now very satisfactory.

Opposition of the thumb is a complex movement of flexion, abduction and internal rotation. Its loss causes grave disability.

To restore function of the thumb it is necessary that these three movements which constitute opposition should be taken into consideration in planning any operation. So far, no operation has been able to give full return of function. (i) If a muscle on the anterior surface of the limb is used as the motive force a certain amount of abduction is produced. (ii) Internal rotation can be effected by the pull being on the outer side of the digit. (iii) Flexion is brought about by the tendon passing from the ulnar to the radial side. The transplanted tendon must act from a fixed point on the ulnar side.

Ney (1921) used the *extensor brevis pollicis* and sutured it to the *palmaris longus*. Steindler (1925) split the *flexor longus pollicis*, and to produce internal rotation brought one end round the dorsum of the thumb. Leo Mayer and Dr. Bunnell (1927) used the tendons of the *flexor sublimis*

to form a loop and also the motive power. Thomas (Kirklin and Thomas, 1948) re-routes the *flexor sublimis* tendon of the fourth finger, using the palmar fascia as a pulley.

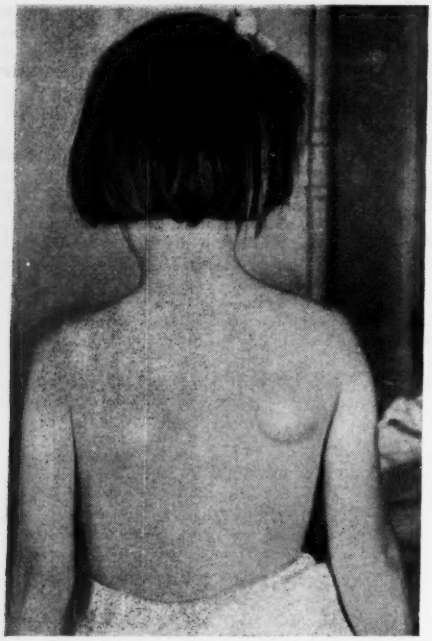

FIGURE IVA.

I have operated in three cases but have varied the technique. The *palmaris longus*, which has a link up with the pattern of opposition of the thumb, has been used as the motive power and the *extensor brevis pollicis* as the

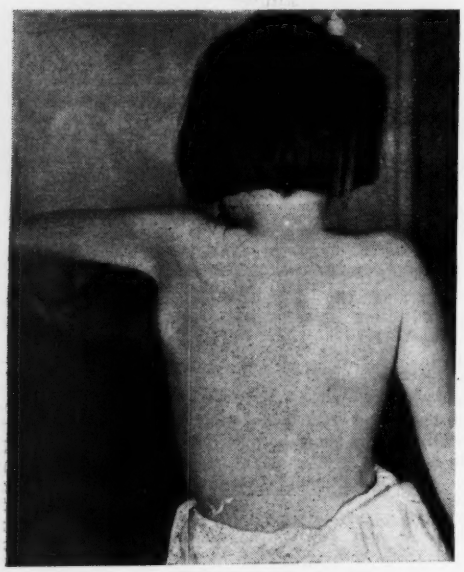

FIGURE IVB.

connecting link. The pulley was formed by a loop of *fascia lata* passed around the *palmaris longus* just proximal to its junction with the *extensor brevis pollicis* and the *flexor carpi ulnaris* close to its insertion. By this procedure the relationship of the structures has been altered as little as possible; the transplanted tendon does not cross the crease of the hand, which appears to me to be a disadvantage where the pulley is placed in the region of the pisiform bone.

FIGURE VA.

These operations were performed on February 11, 1947, May 6, 1947, and May 11, 1948, respectively. In one case the result was excellent. In the other two, in which rather extensive paralysis was present involving the hand and wrist, the results were good and the grip was satisfactory.

FIGURE VB.

Rehabilitation.

Restoration of function depends to a great extent on the after-treatment given to the patients. There must be a balance between rest to allow of healing and movements to restore function. No arbitrary period can be fixed for post-operative rest; if the operation is correctly performed, the binding suture in the tendon should be able to withstand a certain amount of strain.

To prevent overstretching of the muscle, support may be required for a fairly long period. To prevent immobility of the different joints and to preserve bone and joint sense, relaxed passive movements should be commenced early.

Certain joints, such as the shoulder joint and the metacarpo-phalangeal joints, rapidly stiffen if not moved. Active movements are of prime importance for restoration of function. They should be carefully graded. Certain joints can be moved even while the support is worn.

Later on, movements for coordination should be given. Occupational therapy is of value, and vocational therapy should be used in the later stages of rehabilitation.

Summary.

1. Tendon transplantation plays a great part in return of function and prevention of deformity in the rehabilitation of patients with anterior poliomyelitis.

2. Each individual case is a serious problem and the procedure should not be undertaken lightly. It should be based on a sound knowledge of functional anatomy and the general mechanics of the body.

3. A series of cases is quoted. The results have varied according to the amount of paralysis. In all I am satisfied that the operation was justified, and the condition of the child has been improved.

4. I have described a method of transplantation for loss of opposition of the thumb which I have found very satisfactory.

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THE TREATMENT OF FRACTURES IN THE REGION OF THE ELBOW JOINT.[1]

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THE elbow joint is really composed of two separate joints, a main hinge joint between the humerus above and the head of the radius and the greater sigmoid notch of the ulna below, and a lesser joint, the superior radio-ulnar joint, in which the head of the radius rotates within the osseo-ligamentous cuff formed by the lesser sigmoid notch of the ulna and the orbicular ligament. The elbow joint is constructed for active use and mobility. It is therefore better when treating elbow injuries to strive for as much function as possible, even if this course does not give perfect anatomical or radiographic reduction. Before an attempt is made to treat elbow injuries, especially in children, radiographs should be made to show the exact nature of the injury. It is necessary not only to distinguish between supracondylar fracture and dislocation but to determine the direction of the fracture line before reduction. The diagnosis of a fracture in this region depends upon a knowledge of the anatomy and also a correct interpretation of the X-ray plates. In children, and these fractures are very common in children, there is the added necessity of knowledge of the ossification of the bones forming the elbow joint.

[1] Read at a meeting of the Australian Orthopædic Association held at Sydney from June 1 to 4, 1949.

At birth the radiograph of the elbow of a normal child shows no epiphysis. Early in the second year a centre of ossification for the capitellum and outer part of the trochlea appears. About the fifth year centres for the head of the radius and the medial epicondyle are present. Then in the ninth year the centre for the external epicondyle appears, and is followed in the tenth year by centres for the medial portion of the trochlea and the olecranon process. The centres for the external condyle, the capitellum and the trochlea fuse about the fifteenth year, forming the "lower humeral epiphysis", which unites with the shaft after the sixteenth year. The olecranon centre fuses also about this time. In the eighteenth year the medial epicondyle joins the diaphysis and the radial head epiphysis joins its diaphysis about this time. Owing to the number of epiphyses at the elbow and to the variation in different individuals of the same age, it is always best to take radiographs of both elbows in children. This not only will help to rule out a suspected fracture, but also will allow recognition of a displaced medial epicondyle retained within the elbow joint after dislocation, this displaced epicondyle often being mistaken for a secondary ossification centre in the trochlea.

The lower articular surface of the humerus is set obliquely at an angle of 30° approximately with the shaft, and this forward angulation must be restored in reducing supracondylar fractures. The medial border of the trochlea is lower than its lateral border, and so the ulna articulates at an angle with the humerus, forming the carrying angle of the elbow, which is usually about 165°; it is obvious when the forearm is fully extended. The normal range of movement at the hinge joint of the elbow is from 35° to 180°; in complete flexion the tip of the index finger can be placed on the shoulder at the acromio-clavicular joint. The epicondyles and the olecranon process are subcutaneous and form the normal visible and palpable bony landmarks at the elbow. When the elbow is extended they are in a straight transverse line, and they form roughly an equilateral triangle when the elbow is flexed to a right angle.

The brachial artery with associated veins, and the median and radial nerves, lie anteriorly to the elbow joint; the ulnar nerve closely adheres to the posterior surface of the medial condyle. Thus injuries to this joint may be complicated by neuro-vascular interference, and before treatment is instituted it is essential to test for any loss or decrease in the radial pulse and to note any nerve lesion. Damage to the surrounding soft parts may be so extensive as to dominate the course of treatment, as will be seen in compound fractures and also in that dreaded complication Volkmann's ischæmic contracture.

To gain material for this brief paper a study was made of 95 fractures around the elbow joint treated at the orthopædic clinic at Saint Vincent's Hospital, Melbourne, and in my private practice over the past three years. Dislocations of the elbow, unless accompanied by a fracture, are not included. The 95 fractures were made up as follows.

1. Complete fractures of the lower end of the humerus: supracondylar, (*a*) extension type, 4; (*b*) flexion type, nil; (*c*) intercondylar "T" or "Y", 4. Total, 8.

2. Fractures of single condyles or epicondyles: medial epicondyle, 6; lateral condyle, 1; lateral epicondyle, 1. Total, 8.

3. Fractures of the upper end of the ulna: olecranon process, 23; coronoid process, 5. Total, 28.

4. Fractures of the head and neck of the radius. Total, 40.

5. Monteggia type fractures. Total, 6.

6. Automobile elbows (compound). Total, 3.

7. Complications: Volkmann's ischæmic contracture, 1; *myositis ossificans*, 1. Total, 2.

This analysis reveals that owing to the fact that children under the age of fourteen years are not usually treated at Saint Vincent's Hospital, the commonest fracture in adults is that of the upper end of the radius; the next in frequency is fracture of the upper end of the ulna. Usually, of course, the most common fracture around the elbow joint is the supracondylar fracture of childhood.

Discussing each fracture in minute detail I propose to deal only with the immediate treatment of reduction and immobilization of the fractures. Should time permit, general considerations of treatment will be dealt with at the end of this paper. Two types of supracondylar fracture of the humerus are described. In the common extensor type it is seen that the direction of the fracture line (in an X-ray plate) runs anteriorly from behind downwards and forward. This type of fracture is treated by immediate reduction. The degree of swelling around the elbow joint, especially in the antecubital fossa, which is a very common occurrence in these fractures, should be no bar to manipulation and reduction; on the contrary it is a further reason for early treatment. A portable X-ray machine should be present in the plaster theatre and radiographs taken after the manipulations.

A general anæsthetic is administered, and with the aid of an assistant the fracture is reduced. The assistant steadies the arm and the surgeon grasps the wrist with one hand and the region of the fracture with the other hand. The forearm is extended and moderate to firm traction maintained. The thumb of the surgeon's upper hand presses back the distal end of the long proximal shaft whilst the fingers bring forward the small lower fragment. When the two fragments are felt to be engaged, the elbow is then flexed to an angle of about 45°. At this juncture the hand on the wrist is palpating the radial pulse to see that the degree of flexion has not impeded the circulation of the forearm. The assistant now holds the wrist while the surgeon corrects any lateral displacement by lateral pressure between his cupped hands. Control X-ray pictures are taken, and if the position is satisfactory then a posterior plaster slab is applied, extending from the posterior axillary fold to the knuckles. The slab is wide enough to fold round and hold both epicondyles, but does not cover the antecubital fossa or the front of the forearm. This slab is bandaged on by a wet three-inch gauze bandage, and the position of the flexed and pronated forearm is maintained until the plaster sets. This pronation of the forearm corrects any tendency for a varus position to develop at the fracture site. The wrist is then slung from the neck by a collar-and-cuff bandage.

Should the swelling around the elbow be so great that the flexed position impedes the radial pulse, or if it is found that the fragments do not maintain their position, or perhaps that it is not possible by traction and manipulation to reduce the deformity, then Zeno's self-reduction by skeletal traction is used. With the elbow at a right angle, a Kirschner wire is drilled through the ulna two fingers' breadth distal to the top of the olecranon and one finger's breadth below the subcutaneous border. The wire is stretched in a stirrup, and the elbow is suspended vertically by a weight of five to ten pounds from an overhead pulley. The forearm is semipronated and rests in a sling which is suspended directly from the overhead beam. The weight of the child's body gradually reduces the fracture over a period of days, and the arm is in such a position that drainage rapidly diminishes the swelling around the elbow joint. This method can be used also to treat intercondylar fractures and compound fractures, and especially in any case of threatened Volkmann's contracture.

The flexion type of supracondylar fracture is more common in adults. This fracture is reduced by traction with the elbow extended, lateral pressure being applied if necessary to correct alteration to the carrying angle. A posterior plaster slab is applied to the extended arm and forearm. Intercondylar "T" or "Y" fractures of the humerus are more common in adults and are usually due to a fall on the point of the elbow. The lower fragments are usually comminuted, and unless one of the major fragments or a portion of the articular surface is widely displaced or rotated, these fractures are best treated conservatively. The fragments can usually be moulded together by lateral pressure and then a posterior back slab applied with the elbow in a position of about 20° beyond the right angle. Some authorities treat these fractures with the elbow fully extended, while others recommend a hanging plaster cast. Zeno's skeletal traction is very useful also for these fractures.

Fractures of a single condyle or epicondyle will now be discussed. In the series of cases analysed there occurred a total of eight of these types of fractures. Six were fractures of the medial epicondyle, two of which showed little or no displacement. Treatment consisted of supporting the forearm in a sling for three weeks. In the other four cases the fracture of the medial epicondyle occurred in association with a dislocated elbow. When the dislocation was reduced in two of the cases post-reduction X-ray films showed that the medial epicondyle had returned to its normal position, and no other treatment than for the dislocated elbow was necessary. In the remaining two cases the epicondyle remained trapped within the joint after the dislocation was reduced. One was successfully induced to dislodge itself by forcible abduction of the forearm, and the epicondyle was moulded back to its normal position by thumb pressure after the forearm had been flexed. The forearm was then carried in a sling. In the final case manipulation was unsuccessful and open operation was necessary. The epicondyle with the attached flexor group of muscles was hooked out of the joint, the epicondyle was excised and the flexor group of muscles was sutured to the tissues around the fracture site. No trouble in later years is expected from the absence of the medial epicondyle; in fact in cases of ulnar neuritis or neuroma due to alterations in the carrying angle, this operation is recommended and performed by Thomas King, of Melbourne, instead of the more extensive operation of anterior transplantation of the ulnar nerve.

The case of the fracture of the lateral condyle associated with a dislocation of the elbow illustrates the difficulty of treating this injury. A fair reduction was obtained by manipulation but was not considered satisfactory. Open reduction was performed and the condyle retained in position by means of a screw inserted through the condyle into the humeral shaft. In the case of fracture-separation of the lateral epicondyle there was minimal separation, and treatment was by carriage of the forearm in a sling.

Of the fractures of the upper end of the ulna, five were fractures of the coronoid process without displacement and carriage of the forearm in a sling for three weeks followed by active exercises resulted in a successful outcome. Of the 23 fractures of the olecranon process, in 12 there was little or no displacement, and application of a sling for three to four weeks followed by exercises was the treatment. In the remaining 11 cases such a degree of displacement was present that open reduction was considered advisable. Two of the patients had their own views on this procedure and refused operation. The remainder were treated by exposing the fracture site through a postero-medial incision; the hæmatoma was cleared out, and the fragments were opened out for inspection of the elbow joint. Then close apposition of the fragments was obtained and held with hooks. Stainless steel wire was then passed through the drill holes in each fragment and tied so that very close approximation of the fragments resulted. On several occasions a second wire was tied to make certain of the approximation. The incision was then closed, dressings were applied and the forearm was carried in a sling. After several days gradual active exercises were commenced.

Fractures of the radial head and neck formed the largest series of cases. In 26 of them it was considered that little or no displacement of the fracture was present, and the patients were treated conservatively with their forearm in a sling. After three weeks active exercises within the limits of pain were encouraged. It is important to remember that in radiographic examination of the elbow joint the conventional antero-posterior and lateral views are sometimes insufficient, and several oblique views with the hand in varying degrees of supination or pronation may be necessary to be sure no linear fracture is present.

In 14 of these cases the displacement of the fragment or fragments was such that open operation was performed and the head of the radius excised. Excision of a loose fragment only is not considered satisfactory treatment. The head of the radius is excised through a postero-lateral incision placed directly over the head of the radius and lateral epicondyle; good exposure is obtained by extending

the incision upwards, but it should not be prolonged downwards for fear of injuring the posterior interosseous nerve. An excellent view of the elbow joint can be obtained by reflecting the *extensor carpi radialis longus* and *brevis* from their origin with a sharp chisel. The head is divided cleanly and transversely from its junction with the neck by a sharp chisel; no loose fragments or edges should be left. The incision is closed and dressings are applied which extend from the arm to the hand. The arm is carried in a sling and if necessary the patient may leave hospital after two or three days.

We now turn to the difficult and intriguing type of fracture about the elbow joint associated with the name of Monteggia. This consists of a fracture of the upper one-third of the ulna associated with a dislocation of the head of the radius. In the majority of such cases the radial dislocation is anterior, but in a few the dislocation may be posterior. Of the six cases of Monteggia fractures treated, four were compound, the fifth was a recent fracture, while the sixth was one in which the anterior dislocation was present two years after an elbow fracture had been treated. The compound injuries proved to be easier to treat than the closed ones. The wound was excised and the dislocation of the radial head reduced by traction and pressure over the head of the radius. After this manipulation it was seen that the ulna fracture alignment was satisfactory. Control X-ray pictures were taken, and then a plaster cast was applied from the axilla to the knuckles with the elbow at a right angle. In one case treated late at night the reduction of the radial head dislocation was so easy that grave doubts were held as to the final position. Radiographs next day, however, dispelled these doubts, and the patient is making good progress. In the case of the closed Monteggia fracture, manipulation was successful in reducing the anterior dislocation of the radial head. Traction and counter-traction was obtained by pulling on the thumb and fingers by an assistant with the arm band around the lower end of the arm, the forearm being supinated. Then pressure with the thumb forced the head of the radius back into its correct position. When control X-ray films showed a satisfactory reduction, a Kirschner wire was drilled through the neck of the radius and through the upper fragment of the ulna. A plaster cast was then applied, the wire being incorporated in the cast. The cast remained on for a period of three months until the ulna fracture was firmly united. The child was finally discharged from hospital with a good range of movement, the only disability being a loss of 10° from full extension.

Three cases of compound fracture-dislocation of the elbow were encountered. I have called them "automobile elbows" for want of a better name. The treatment in cases of this type is usually dictated by the amount of soft-tissue damage. There is present a comminuted fracture of the lower end of the humerus with a compound fracture of the ulna and a dislocation of the head of the radius. In the first case the patient was so shocked and soft-tissue damage so extensive that immediate amputation through the fracture site of the humerus was performed. In the second case soft-tissue damage was extensive, but the nerves and brachial artery were intact. It was not possible after excision of the damaged soft tissue to close the wound, and so a primary excision of the elbow was performed. Although a flail elbow resulted, the patient is very satisfied. He is an engineer and designed for himself a patent elbow joint in association with a leather moulded splint. He now drives his car and can play quite a good game of golf, winning a trophy, I believe, about six months after his injury. The third patient is still under treatment and although the condition is causing some anxiety it is hoped that a useful arm will result. This case was complicated by a skin loss on the front of the elbow over an area of almost five inches by three inches. A primary skin graft was applied after excision of the wound, and quite a good "take" resulted.

I fear that no time remains to discuss even briefly the complications that arise in these fractures. In two cases —one of Volkmann's contracture, the other of *myositis ossificans*—the patients were referred for treatment. The Volkmann's contracture was a moderately severe condition, which developed after splinting of a fracture of the middle third of the ulna and a fracture of the radial neck. By use of a leather moulded splint with elastic traction to the thumb and fingers, a very satisfactory result was obtained.

Finally, a word may be said concerning the use of physiotherapy in the treatment of fractures of the elbow joint. Personally, I believe that the less physiotherapy such patients receive the better. If encouraged to use their elbows in the slings up to the limit of pain—that is, no movement is to be carried out which causes pain—they will regain quickly a good range of movement. They must be forbidden to carry any weights and must under no circumstances be given passive movement or forced manipulation. One patient in this series had quite a lot of physiotherapy and one manipulation for a fracture of the olecranon without displacement. Eighteen months elapsed before she obtained a reasonable range of flexion and extension.

Acknowledgements.

In conclusion I wish to thank the executive committee for doing me the honour of asking me to deliver this paper. I also wish to acknowledge help which I have received from Dr. Thomas King, who has made available to me the case histories and X-ray films of many patients from the orthopædic clinic at Saint Vincent's Hospital, Melbourne.

SACRO-ILIAC TUBERCULOUS ARTHRITIS.[1]

By DOUGLAS PARKER,
Hobart.

TUBERCULOUS DISEASE of the sacro-iliac joint has been regarded both as rare and also as having a bad prognosis. In Tasmania, however, it will be shown that the disease is not uncommon and occurs more often than does similar disease of joints of the upper limb and of the knee and ankle.

To ascertain the incidence of this disease in the community the records of the Royal Hobart Hospital were reviewed. These represent all cases of surgical tuberculosis among patients admitted to hospital and treated during the twelve-year period from 1936 to 1948. The hospital draws on the whole population of the southern portion of Tasmania, some 125,000 in number. The patients treated would represent the great majority of all cases occurring in the community. These statistics thus give an accurate indication of the frequency with which the various joints are attacked.

The Nature of the Infecting Organisms.

Every opportunity was taken to grow the tubercle bacillus from any pus which had been obtained from aspiration or from tissues obtained at operation. Prior to 1941, 15 specimens of osseous tuberculosis were submitted to Dr. Reginald Webster, pathologist of the Melbourne Children's Hospital. From these were grown the human strain of the tubercle bacillus.

From January, 1941, to April, 1948, the following examinations were carried out at the Royal Hobart Hospital (Table I).

In not one instance was the bovine bacillus found.

From this evidence it must be assumed that the human strain of the tubercle bacillus is the causal organism of the great majority of tuberculous infections in this island.

These figures are in great contrast with those of Great Britain. Mercer (1936) states:

> In Scotland, Fraser considered that sixty per cent. of cases were due to the bovine type of tubercle bacillus. In England, Griffiths estimated that sixty-six to seventy per cent. of cases are of human type and Morrison found seventy per cent. of children and eighty-two per cent. of adults were due to the human strain.

[1] Read at a meeting of the Australian Orthopædic Association held at Sydney from June 1 to 4, 1949.

Dr. Reginald Webster, of the Melbourne Children's Hospital, in a survey carried out between 1938 and 1941, found as follows (Webster, 1942):

> No instance of bovine infection occurred in 183 adult subjects of tuberculosis in a variety of clinical forms other than pulmonary. Of 123 children aged fourteen years and under, 11 were infected with *Mycobacterium tuberculosis* of bovine type—a bovine incidence of 8·9%. A similar investigation completed in 1932 showed a rate of bovine infection of 25·9%.
>
> The lowered incidence of bovine infection in tuberculosis of childhood, as observed at the Children's Hospital, Melbourne, is correlated with a striking reduction in the number of tuberculin reactors in herds supplying milk for distribution in the Melbourne metropolitan area.

TABLE I.

Tissue or Fluid.	Total Specimens Examined.	Number from which Tubercle Bacillus (Human) Grown.
Sputum	348	37
Gastric juice	263	11
Pleural fluid	97	9
Urine	96	21
Pus	95	41
Cerebro-spinal fluid	35	19
Knee-joint fluid	9	1
Synovial fluid (knee)	3	—
Fallopian tube	2	—
Fæces	7	—
Ascitic fluid	2	—
Testis	2	1
Glands	2	1
Breast	1	1
Finger	1	—
Milk	1	—

The Agriculture Department of Tasmania supplied the following data on the incidence of tuberculous infection in the herds of the island.

> It is considered that the incidence of bovine tuberculosis in the general herds of the island is below 0·25 per cent., and in an examination of 3,000 head of cattle, two or three were found to be tuberculous. As a result of the low incidence of disease it is not considered worth while testing the herds at the present time.

This low incidence of disease is considered to be in no small measure due to the fact that the dairy herds are not housed during the winter months, as is the custom in Europe; this is an important factor in preventing the spread of tuberculous disease among the herds.

Mode of Spread.

Tuberculous disease of bone is regarded as secondary to an established focus elsewhere. The primary foci are generally accepted as the bronchial lymphatic glands and the mesenteric glands.

What, then, is the mode of spread? Is it by blood-stream or lymphatics? What part does trauma or persistent stress play in the localization of disease?

In this series the low incidence of disease in the upper limb is striking (Table II). The high incidence of disease in the spine is also outstanding and requires explanation. Apart from the high incidence of disease in the spine, the other sites appear to be affected according to the distance the organism would have to travel in the arterial blood-stream. Thus the ankle has the lowest incidence in the lower limb.

Various theories have been put forward in the past to account for the spread of the disease.

1. That it is spread as an embolus. The arterial route has generally been accepted as the channel by which this takes place. The site in which the emboli lodge will be that in which the blood supply is particularly good. When ossification is rapidly and energetically taking place these sites will have an abundant blood supply. Such a site is the epiphysis of the posterior part of the wing of the ilium. It will be shown later that in this series the sacro-iliac joint is attacked almost entirely during the time that this epiphysis is present and active between the ages of fifteen and twenty-five years.

2. That it is spread by lymphatic channels. Lymphatic spread from the hilum of the lung to the vertebral column would be against the lymphatic stream emerging from the individual vertebra. This is extremely unlikely. The bone itself is most usually attacked either centrally or below the epiphyseal plate. Such a site is best explained by a blood-borne infection.

3. That it is spread by the venous route. The overwhelming predominance of spinal caries must have some explanation. Boyd (1947), writing on Pott's disease, draws attention to the fact that the spine is attacked more frequently than all other bones of the body. The lower three dorsal vertebræ and upper two lumbar vertebræ are those most commonly affected. In this series there are 83 cases of spinal caries among a total of 192 patients. This site (lower dorsal and upper lumbar) has been the one principally attacked. There is certainly a short arterial route, but it is considered that this is not the whole explanation. Recent anatomical work carried out on the vertebral venous system supplies a very logical explanation of how these sites may be affected. W. F. Herlihy (1947), writing on the vertebral venous system, draws attention to the function of the vertebral veins. These veins constitute a reservoir of blood and are a regulator of venous pressure. With rise of intrapleural pressure from ordinary respiration, or from any forced acts such as straining or coughing, this pressure is further increased. The flow of blood in the blood channels on either side of the spinal column—the azygos and the hemiazygos—is forced into the vertebral plexus and into the actual vertebræ themselves. There is possibly some retrograde flow, as there are no valves in these veins. The two bronchial veins on each side, which drain the small and larger bronchi, also receive the drainage of the lymph nodes of the hilum of the lung. The right enters into the arch of the azygos and the left into the superior hemiazygos. The hilum of the lung lies opposite the sixth dorsal vertebra. With retrograde flow in the vertebral veins, and these veins possess no valves, it is possible that the lower dorsal vertebræ would receive a persistent bombardment with the tubercle bacilli. This theory would explain the overwhelming incidence of the disease in the spine, and the lower dorsal region of the spine in particular. Rise in intraabdominal pressure would also divert blood from the ascending lumbar veins on either side of the vertebral column to the vertebral venous plexus. Venous drainage from the lymph glands at the root of the mesentery must be assumed to drain to the ascending lumbar veins. Such a route would explain the frequency of the incidence of disease in the lumbar spine.

TABLE II.

Tuberculous Bones and Joints: 1936–1948. Incidence at Various Sites.

Site.	Number of Cases.
Spine	83
Hips	37
Sacro-iliac	22
Knees	21
Ankles	10
Shoulders	7
Elbows	2
Wrists	3

4. That it follows trauma. Trauma has been invoked as a predisposing cause for the onset of infection in a particular bone or joint. In this series of cases the upper limb has been attacked on 13 occasions only. On the other hand, in the lower limb the figures read: sacro-iliac, 21; hip, 37; knee, 21; ankle, 11. There appears to be a definite and gradual numerical decline in the incidence of the disease the farther one travels down the limb. It is thought that the ankle would sustain just as much of

TABLE III.

Tuberculous Bones and Joints: 1936–1948. Age and Sex Distribution.

Site.	Total Number of Cases.	Number of Cases by Age Groups and Sexes.									
		1 to 5 Years.		6 to 15 Years.		16 to 30 Years.		31 to 40 Years.		41 Years Upwards.	
		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Spine—											
Cervical	2	—	—	1	—	—	—	—	—	1	—
Dorsal	27	—	1	—	—	6	7	4	—	4	5
Lumbo-dorsal	4	—	—	1	—	1	2	—	—	—	—
Lumbar	39	2	—	2	1	6	10	6	4	5	3
Lumbo-sacral	3	—	—	—	—	—	2	—	1	—	—
Not stipulated	8	—	—	—	—	3	3	—	—	—	2
Total	83	2	1	4	1	16	24	10	5	10	10
Sacro-iliac	22	2	—	2	—	7	10	—	1	—	—
Lower limb—											
Hips	37	1	1	8	3	2	9	5	1	3	4
Knees	21	—	—	4	2	3	2	5	1	1	3
Ankles	10	—	—	1	2	2	3	2	—	—	—
Total	68	1	1	13	7	7	14	12	2	4	7
Upper limb—											
Shoulders	7	—	1	1	—	2	—	2	—	1	—
Elbows	2	—	—	—	—	2	—	—	—	—	—
Wrists	3	—	1	—	—	—	—	—	1	1	—
Fingers	2	—	—	—	—	1	—	1	—	—	—
Ribs	2	—	—	—	—	—	—	1	—	1	—
Sternum	3	—	—	—	—	—	1	1	1	—	—
Total	19	—	2	1	—	5	1	5	2	3	—
Grand total	192	5	4	20	8	35	49	27	10	17	17

both chronic stress and sudden trauma as the knee. The conclusion to be drawn from these figures is that the distance that the invader has to travel in the blood-stream is a very important factor in the localization of the disease, and that the role of trauma in precipitating the onset of disease at a definite area is uncertain.

Lowered Resistance of Patient.

There is no doubt that lowered resistance of the patient plays a big part in the spread of this disease. It would account for the cases of widespread lesions which do occur.

In these individuals bacillæmia must undoubtedly be present. What actually precipitates and localizes the lesion is hard to assess accurately.

Other Tuberculous Lesions Present.

Six patients in this series had additional sites affected. The spine was involved three times, the hip once, the sterno-clavicular joint once. The lungs were also involved in three patients, one of whom died from a miliary infection.

Incidence of Tuberculous Arthritis of Sacro-Iliac Joints.

In this series there are 22 cases of tuberculous arthritis of sacro-iliac joints. There are practically the same number of sacro-iliac joints affected as there are knee joints. This observation is contrary to general teaching. Most authorities state that the incidence of such disease is rare. Seddon (1940), in writing of this subject, reviewed 170 cases. These were drawn from hospitals serving a large portion of Great Britain and from time intervals extending back some years.

The writer has had the opportunity of treating the great majority of the patients in the series reported here. The impression has grown that the disease of this joint is commoner than is supposed. It is felt that many cases have not been diagnosed accurately in the past, especially when the X-ray signs have not been definite, and that when a cold abscess has formed and discharged in the psoas region the lumbar part of the spine has been falsely accused.

The early diagnosis is difficult. One lacks the muscle spasm of the spine and hip to limit movement and produce characteristic deformity. To make the exact diagnosis more difficult, the early X-ray signs are of little value and lag behind the clinical symptoms.

The Age of Onset of Sacro-Iliac Tuberculosis.

In this series the age groups and numbers of cases are as follows: nil to five years, 1; five to ten years, 1; ten to fifteen years, 1; fifteen to twenty years, 10; twenty to twenty-five years, 3; twenty-five to thirty years, 3; thirty to thirty-five years, 1; thirty-five to forty years, 1. One patient, aged forty years, had a "flare-up" of an old infection; the original attack of illness had occurred during adolescence.

It is interesting to note that the centre for ossification of the posterior superior iliac spine and the neighbouring portion of the posterior iliac crest appears at the age of fifteen years and finally fuses at the age of twenty-five years. During this period the blood supply to this area would be increased. This is regarded as the principal cause in determining the site of onset of the disease in this area.

Sisefsky of Varberg, Sweden, in reviewing a series of 66 cases of sacro-iliac tuberculosis, found that 45 of these occurred between the ages of fifteen and thirty years.

The X-Ray Appearances.

The superimposition of the bones forming the joint renders the actual details of the joint difficult to read. Such points as decalcification of the bones and loss of joint detail are very difficult to assess, and one side must be accurately contrasted with the other. In addition, gas shadows from the bowel may further cloud the picture. As already stated, when the patient first attends at an out-patient clinic the X-ray findings may be entirely negative.

Three months was the shortest period from onset of first symptoms before the X-ray findings were positive.

The earliest signs that have been noted are erosion of the joint margins, particularly in the lower part of the joint. In several cases paraarticular erosion has been observed. Blurring of the joint outline may be the only early sign. Another feature has been noted by the author, and it is regarded as very significant and diagnostic. This is a definite alteration in the alignment of the components of the joint. Thus there appears a definite "shift" of the ilium medially and upwards. It really is a subluxation of the joint. In the early stages the "shift" is medial only. Later it is more prominent, and the upward movement takes place. The change can first be picked up by actually measuring the distance from the fifth lumbar spine to the crest of the ilium if it is suspected. This change in joint structure is analogous to the loss of joint space occurring in disease of the hip and spine. The later changes are those of obliteration of joint space and sclerosis of the adjoining bones, and indicate quiescence of the lesion.

Presenting Signs and Symptoms.

Pain.

Low Backache.—Low backache was a constant feature and varied in degree. In the very early stage the results of physical examination may be negative, but the patient complains of low backache and localizes it to the sacro-iliac joint.

Localized Pain over the Sacro-iliac Joint.—With progress of disease the pain becomes more localized and palpation over the joint causes pain. When this is present, the picture also is definite. The limp has appeared and other signs are present: (i) straight leg raising is restricted; (ii) pain is caused by compressing the pelvis and springing the joint—a manœuvre carried out by putting the sacro-iliac joint on the stretch by flexing the thigh and knee of the affected side with the patient supine and pressing the thigh into extreme adduction.

Sciatic Pain.—One patient had sciatic pain. It occurred early and was associated with definite signs of sacro-iliac arthritis.

Pain Referred to the Ischial Tuberosity.—One patient presented with pain referred to the ischial tuberosity and this proved puzzling. The pain was relieved by weight extension, and the patient resumed her duties as a nurse. Symptoms recurred after a month with localized sacro-iliac pain, and later positive X-ray findings established the diagnosis.

Pain on Turning in Bed.—Pain on turning in bed proved a reliable clinical test to apply and was found constantly present, the pain being accurately localized to the affected joint.

Limp.

Limp was present in about half these patients when they were first examined. It is quite characteristic; the patient takes short steps and hurries off the affected leg. When present it indicated established disease, and definite local signs were present.

Abscess.

Four patients presented with abscesses, three gluteal and one psoas. These patients all had had symptoms of low backache for some months.

Differential Diagnosis.

The following conditions need to be considered in the differential diagnosis:

1. Affections of the muscles in the area, particularly traumatic injuries and myositic conditions.

2. Postural strain to the joint arising from faulty posture.

3. Sprain injury of the joint. The history may be helpful here, but even so great difficulty will be found in differentiating this condition before positive changes take place in the X-ray appearance.

4. Disk injuries. These have to be considered. The site of pain is generally localized above this joint. Sciatic pain can occur, however, in some cases of tuberculous sacro-iliac arthritis.

5. Ankylosing spondylitis in its very early stages. The pain here, however, is generalized, and X-ray examination shows involvement of both joints.

6. Tuberculous arthritis of the lumbo-sacral junction.

7. Spondylolisthesis of slight degree. The diagnosis is that of chronic low backache, which is always difficult. In this series one patient had had manipulation elsewhere, with the result that the patient had an acute "flare-up" of the local condition and early abscess formation.

Diagnosis and Management in Suspected Early Cases.

The age of the patient is most important. Any patient between the ages of fifteen and twenty-five years complaining of pain situated over the sacro-iliac joint which persists for some time must be regarded with strong suspicion.

History of contact with tuberculosis is also further presumptive evidence. It is important that nurses undergoing training should be watched closely for symptoms. In this series there are two nurses, one in the last year of training and one who had just completed her training.

A positive Mantoux reaction would provide further evidence, and this should be supplemented with a blood sedimentation rate estimation.

Should there be a limp and local evidence of tenderness over the joint and pain on springing the joint, the patient should be put to bed for a period of diagnostic rest. This should be done even if there are no positive X-ray signs. Nursing should, if possible, be in the open air, and it is sufficient to keep the patient at rest in an ordinary bed with a firm mattress.

It has been found that three months has been the shortest period to elapse before X-ray changes have been sufficiently definite to warrant the making of diagnosis. Should the X-ray findings remain negative and the blood sedimentation rate low, should there be no evidence of any thickening over the joint or indication of early abscess formation, and should all joint signs remain quiescent, then the patient can be cautiously allowed up. Reappearance of any symptoms or signs calls for a further diagnostic period of rest.

Should the home conditions of the patient be satisfactory, it has been the practice to allow these patients to go home to an open-air veranda.

In suspected cases, this routine was followed and proved satisfactory. When positive X-ray findings appeared the patients were rigidly immobilized.

Treatment in the Established Case.

Recumbent treatment in open-air wards has been insisted on whenever possible. If this has not been possible, and if home conditions have been suitable with an open-air veranda, these patients have been allowed to go home once their temperature has settled. In the absence of abscess, or after abscess has subsided, immobilization has been carried out by a long plaster spica. When an abscess was present, a plaster bed with a turning case has been used. The abscess has been dealt with by repeated aspiration.

The aim of treatment whenever possible has been to carry out operative fusion of the joint when conditions were satisfactory for this to be done. However, operation has had to be denied patients because of (i) persistent sinus in the operative field, (ii) other joint infections, and (iii) lung involvement. This was, however, before the advent of streptomycin.

Operative Treatment.

Operative treatment has been carried out on seven patients and one is awaiting operation. Before this is carried out it is essential that the general condition of the patient should be good. All signs of abscess formation

should be cleared up. The temperature should have been settled for some time. The blood sedimentation rate should be low. It has been the policy generally for the patient to have from nine to twelve months' recumbency in the open air. The chest is examined radiologically to exclude any possibility of latent infection there.

The X-ray examination of the joint itself should show a quiescent stage of the disease—marginal sclerosis of the joint preferably. The other important point is that the joint surfaces should be approximated by the shift of the ilium already pointed out. Should there be any widening of the joint then the extraarticular arthrodesis will merely keep open the joint surfaces and prevent the natural cure of the condition by fibrous ankylosis of the joint. This is a basic principle in any extraarticular arthrodesis. Natural collapse and approximation of joint surfaces must have taken place before operation is carried out. The writer has seen several spinal grafts carried out early in the course of the disease before such approximation has taken place between the affected vertebræ; the result has been persistent local activity and sinus formation.

The operation carried out in this series has been the extraarticular arthrodesis according to the method of Verrall. It has been chosen because of the ease with which the operation can be carried out, and the extraarticular site of the operation, which thus avoids the location of the disease.

The patients were kept recumbent for four months after operation.

Streptomycin.

Streptomycin has been freely available only during the past nine months. It has been used in all cases with sinus formation. It has been applied locally to the affected sinus; a strength of one gramme to 10 millilitres of distilled water has been used, and gauze soaked in this has been applied daily. At the same time it has been given intramuscularly, 0·25 gramme being given twice daily for six weeks. Two patients with sinuses did well; the sinuses closed, permitting operation to be carried out. It is well to point out, however, that the sinuses had been present for a considerable time and were small when treatment was given.

In other cases of surgical tuberculosis with sinus formation, the patients also have been given streptomycin, both locally and intramuscularly. The effect in all cases has been good. Discharge from the sinus has lessened, and in several instances complete closure has taken place. When operation is performed, streptomycin cover is now given, and the treatment is commenced two weeks before operation and continued for four weeks after operation.

Abscess Formation.

Abscess formation occurred in 16 of these cases. In 14 the site of the abscess was posterior, either over the sacro-iliac joint itself or lateral to it beneath the gluteal muscles. In two instances the abscess pointed anteriorly below Poupart's ligament in the situation of the ordinary psoas abscess.

Most patients volunteered the information that backache had decreased with the appearance of the abscess. This observation, that pain often disappeared with the appearance of an abscess, is in keeping with the findings of other observers, notably Seddon. The disappearance of pain was considered to be due to the escape of pus from the narrow confines of the joint space with consequent relief of tension.

In all cases in which an abscess was present, positive changes in X-ray findings could be seen. The time at which the abscesses appeared varied; some occurred while patients were undergoing treatment. The abscess made its appearance at three and four months respectively in two cases in which the patient had been kept under observation from the earliest symptoms.

The abscesses proved most resistant to treatment and took longest to clear up in those cases in which abscesses were present when the diagnosis was first made. The patients had been attempting to carry out their ordinary routine.

The abscesses were treated by routine aspiration at intervals until the pus had cleared. Unfortunately, in the earlier cases several patients developed sinuses.

Results of Treatment.

Four deaths have occurred in this series: two from amyloid disease, one from miliary tuberculosis, and one from secondary tuberculous infection of the renal tract.

Eight patients have been operated upon with no deaths. Five of these patients have resumed civil life. One woman has married and been delivered of a child by Cæsarean section. Three have had the operation within the last six months.

One patient developed multiple recumbency renal calculi.

Two patients treated conservatively had relapses—with discharge from previously healed sinuses.

Conclusions.

1. Early recognition of the disease is important in obtaining good end-results. Early immobilization will tend to prevent the formation of abscesses, and should they form they will respond more rapidly to treatment.

2. Streptomycin is a very important aid in the treatment. It will aid in clearing sinuses and allow operation to be undertaken on those patients to whom previously operation had to be denied. It also should be given as a cover at the time of operation. It is felt that the poor prognosis which has been associated with this disease is due to the fact that its recognition has often been late after abscess formation has been well established and sinus formation has taken place; in the past, before the days of chemotherapy, sinus formation in such a situation carried with it a very severe mortality.

3. The operation of extraarticular arthrodesis gives excellent end-results.

Summary.

1. A series of cases of surgical tuberculosis occurring in southern Tasmania and extending over twelve years is reviewed.

2. It is considered that the human strain of tuberculosis organism is causal in all cases.

3. The high incidence of spinal tuberculosis in this series is noted and an endeavour is made to explain it. It is considered to be due to blood-borne attack through the vertebral venous system.

4. Sacro-iliac tuberculosis is discussed.

5. Alteration in the alignment of the components of the joint seen in the X-ray film is regarded as diagnostic; it is a "shift" of the ilium medially and upwards.

6. Treatment, when possible, should be completed by the performance of an extraarticular arthrodesis.

7. Streptomycin is a valuable aid in the treatment.

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Legends to Illustrations.

FIGURE I.—*Skiagram shows comparatively early left sacro-iliac* tuberculous arthritis and erosion of the lower articular margin of the joint with early "shift" of the ilium towards *the centre. Cold abscess is now present;* it first appeared over the site of the joint posteriorly, and the sinus also pointed in the front above Poupart's ligament. Patient at *present* is undergoing recumbent treatment preparatory to grafting.

FIGURE II.—B.D., April 20, 1944. Skiagram shows sclerosis of the left sacro-iliac joint. At this stage no appreciable "shift" has taken place. Contrast this with the skiagram after bone graft has been carried out.

FIGURE III.—B.D., January 22, 1947. Skiagram three years later shows quiescent sacro-iliac disease with the bone graft in position. Bone grafting has been carried out now for three years. Patient had a cold abscess before operation.

FIGURE IV.—M.H., May 28, 1947. Skiagram taken when patient first reported is not characteristic except that there is early "shift" of the ilium towards the centre. This was sufficient for us to regard this patient as having early tuberculous sacro-iliac disease, and he was given recumbent treatment.

FIGURE V.—M.H., September 23, 1947. Skiagram four months later now shows very characteristic erosion of the lower margin of the sacro-iliac joint with further shift of the ilium towards the centre.

FIGURE VI.—M.H., June 24, 1948. Skiagram one year later shows that area of erosion has now diminished. There is margin sclerosis present and a further "shift" of the ilium appears to have taken place. This patient has had recumbent treatment and is now about to have grafting carried out.

THE TREATMENT OF SLIPPED FEMORAL EPIPHYSIS.[1]

By ESMOND F. WEST,
Adelaide.

IN presenting this paper on experiences in the treatment of slipped upper femoral epiphysis, I must say at the outset that my own experience has not been extensive. This paper is based upon 17 cases in which I have personally carried out the treatment. However, there are definite problems concerned in the treatment of these patients, and there seems to be no uniformity of opinion amongst orthopædic surgeons as to the best method of treating those with much displacement.

Little need be said of the ætiology of the condition. It occurs in adolescence between the ages of ten and sixteen years. Rather more than one-half of the patients are overweight and show signs of pituitary disorder (*dystrophia adiposo-genitalis*, or Fröhlich's syndrome). In all cases, even those with mild displacement, changes in the epiphyseal line are shown in radiographs; these consist of a widening and irregularity of the epiphyseal line with a cyst-like area of rarefaction in the metaphyseal region.

These changes may be due, in the group with internal glandular disorder, to an anomaly of ossification. In the other group without glandular disorder the changes are possibly the result of mild trauma. The underlying pathological changes, however, require further investigation and elucidation. In cases with much displacement there is often a history of intermittent limp and pain for some months prior to the onset of pronounced deformity, which may follow a strain such as jumping to the ground from a height of a few feet. The limb is then found to be externally rotated and shortened, similar to the condition in an adult with a fracture of the neck of the femur.

In a meeting such as this it would seem unnecessary to emphasize the need for early diagnosis, but when one considers how much more difficult is the treatment of patients with this condition with much displacement than the treatment of those with slight displacement, such a need becomes obvious.

Recent work on the blood supply of the femoral head by F. R. Tucker (1949) is of interest in a study of the treatment of slipped upper femoral epiphysis. In this work no branches of the nutrient vessels of the femoral shaft were demonstrated crossing the epiphyseal plate to the epiphysis in patients of an age less than thirteen years. If such vessels were present they would be destroyed when the epiphysis slipped.

In only one-third of the specimens in children up to thirteen years of age did vessels from the *ligamentum teres* penetrate the fovea and supply the deep cartilage of the head or the ossific centre.

[1] Read at a meeting of the Australian Orthopædic Association held at Sydney from June 1 to 4, 1949.

The main blood supply of the upper femoral epiphysis was found to come through the retinacular vessels, of which there are three main groups—postero-superior, postero-inferior and anterior. Of these the anterior group is the smallest and least constant; the two posterior groups are moderately large and quite consistent, the postero-superior being usually the larger.

Certain of these vessels will be torn, stretched or otherwise damaged when the epiphysis slips, mainly those on the postero-inferior aspect of the neck being left to carry on the blood supply.

It is imperative in treating this condition not to do anything which would further adversely affect this already diminished blood supply. Further damage to this blood supply is liable to produce changes of avascular necrosis in the epiphysis with degenerative changes in the articular cartilage, shown in the radiograph by narrowing of the joint space and clinically by stiffness of the joint.

In a consideration of the problem of treatment these cases divide themselves into two groups as follows:

1. Those with a mild degree of displacement. In these I include all cases in which the amount of displacement seen in either antero-posterior or lateral radiographic views does not exceed one centimetre.

2. Those with a grosser degree of displacement. These comprise cases in which the displacement in either view exceeds one centimetre. It is usually much greater than this, ranging in amount from three-quarters to complete.

In group 1 the problem is relatively simple. I think all will agree that something has to be done to arrest any further displacement, and the best and quickest way to do this is to produce fixation of the epiphysis to the neck by means of a Smith-Petersen type of nail.

A consideration arises as to whether a period of preliminary traction should be instituted to try to reduce the displacement completely before fixing it. Personally I have not had much success with this. One has to be careful when interpreting radiographs, especially antero-posterior views with the limb medially rotated, in which the displacement is masked. My opinion is that mild displacements can safely be ignored and the epiphysis fixed in this position. Forcible reduction is condemned owing to the danger of further damage to the blood supply of the epiphysis. In the actual insertion of the Smith-Petersen nail care must be taken to see that this is centrally placed and that the tip of the nail passes well up to the bony cortex of the epiphysis. Good lateral radiographs at the time of operation are essential to verify this. The type of nail with tapered fins is preferable to the pattern used in vitallium nails with square-cut ends.

After fixation it is remarkable how quickly the epiphyseal line closes and unites; this may occur in three months. Apparently as soon as the slipping strain is prevented, the rarefying and softening process stops and premature closing occurs. In unilateral cases the patient can get up in a few weeks and use crutches to avoid weight-bearing. The nail is removed when radiographs show that the epiphysis is firmly united. A close watch should be kept on the other hip, especially in patients with glandular disorder, to detect early signs of a similar process on this side.

Patients in this group can, of course, be treated by prolonged continuous traction, but this is unsafe and time-consuming and I think not to be compared with use of the nail.

It is when the group 2 type is considered that difficulty occurs, and in this there is considerable difference of opinion.

In these cases, if symptoms have been present only for a few days, continuous traction may reduce the displacement sufficiently to bring them into group 1, so that fixation by a nail can be performed, but the patients are seldom seen so early and even then traction may fail. It is said that gentle manipulation with the patient under an anæsthetic can safely be tried in cases of acute slipping, but I consider that this is too likely to damage the blood supply. Certainly no force should be used. The epiphysis soon becomes

ILLUSTRATIONS TO THE ARTICLE BY DR. DOUGLAS PARKER.

FIGURE I.

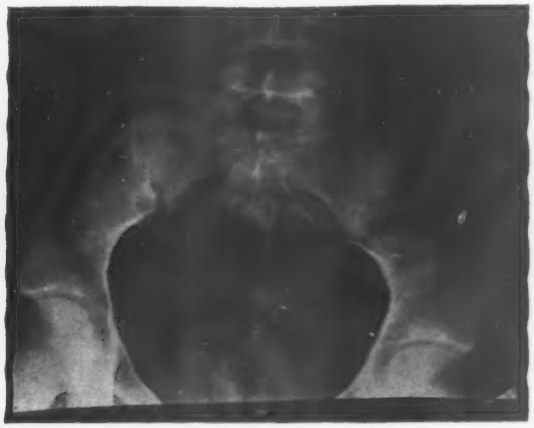

FIGURE II.

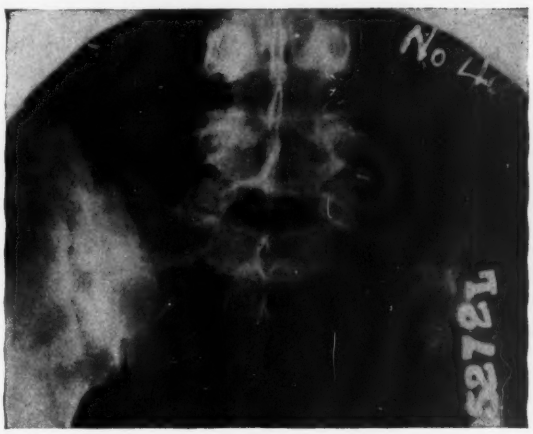

FIGURE III.

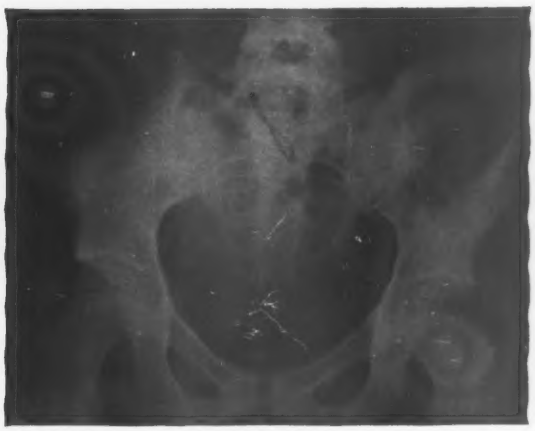

FIGURE IV.

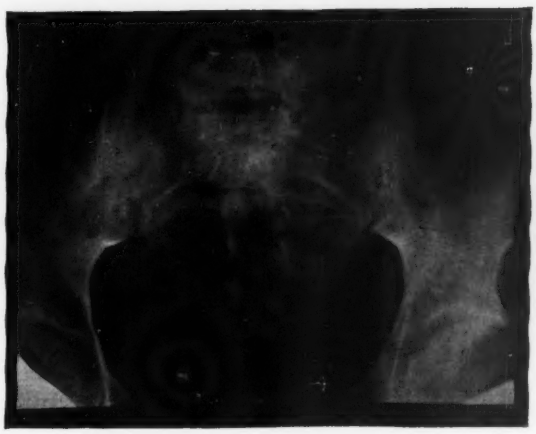

FIGURE V.

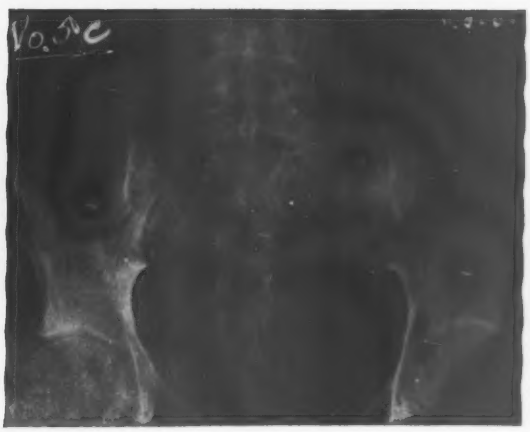

FIGURE VI.

ILLUSTRATION TO THE ARTICLE BY DR. FRANKLIN R. FAY.

FIGURE I.

Oblique radiograph of right hand, showing the calcareous deposits in the subcutaneous tissues and demonstrating that the majority of the deposits are on the flexor aspect.

ILLUSTRATION TO THE ARTICLE BY DR. JOHN RAE.

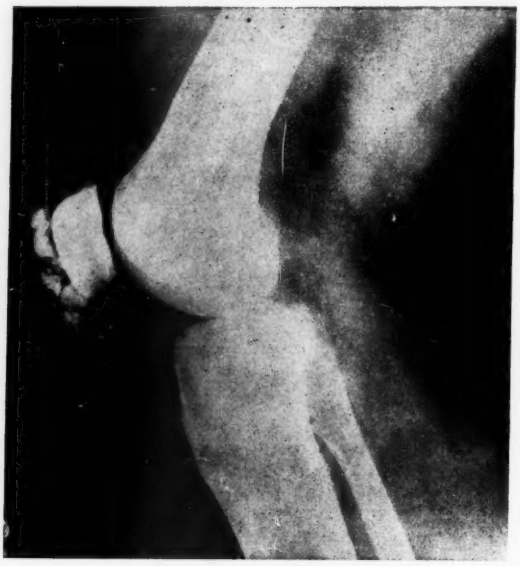

FIGURE I.

ILLUSTRATIONS TO THE ARTICLE BY DR. M. P. SUSMAN.

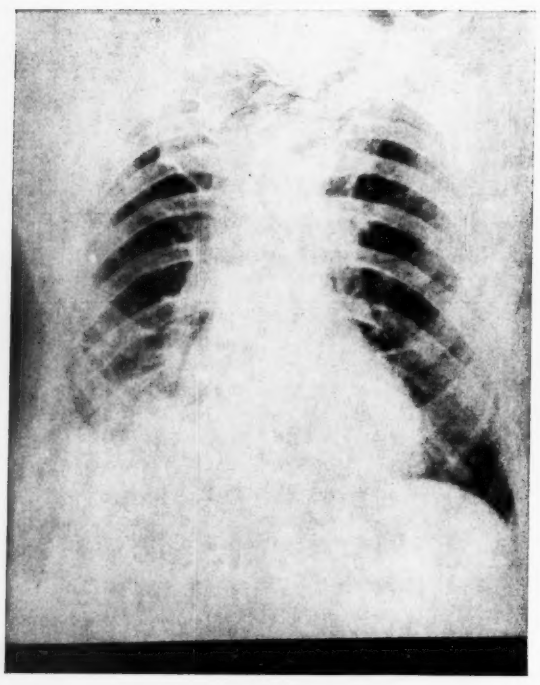

FIGURE I.

Postero-anterior view showing opacity in right cardio-phrenic angle.

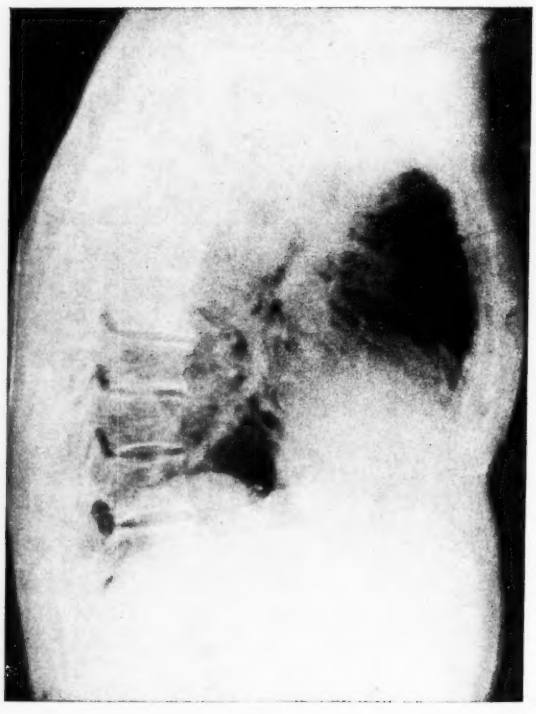

FIGURE II.

Lateral view showing the opacity behind the lower end of the sternum.

fixed to the neck by firm fibrous tissue, while it is anchored to the acetabulum only by the *ligamentum teres*. Manipulation of such a hip not only fails to accomplish reduction, but damages the *ligamentum teres* with its blood supply. If the manipulation is successful, the remaining periosteal and retinacular attachments posteriorly and inferiorly must be torn to allow reduction. Avascular changes are then sure to follow with subsequent joint stiffness. Replacement of the epiphysis into its normal relation with the neck is of little use if the hip becomes stiff; the result is a tragedy.

This brings us to open methods of reduction. P. D. Wilson (1924) advocated open reduction twenty-five years ago. The hip was exposed, the capsule opened and the epiphysis prised back into position, after its fibrous or bony attachment to the neck had been freed. This method has not gained popularity in England, owing again to the danger of further damage to the blood supply of the head. It has, however, its advocates in America, although recent refinements in the operation, as described by Martin (1948), Badgley and others (1948), consist of a removal of sufficient bone on the anterior and superior aspects of the neck to allow the neck to be easily reduced into the head. This amounts to a cuneiform osteotomy of the neck even in recent cases. Extreme care and gentleness are exercised to avoid stretching or damaging the retinacular vessels on the inferior and posterior aspects of the neck, which carry the only remaining blood supply to the head.

After the epiphysis has been realigned it is fixed by a Smith-Petersen nail introduced over a guide wire through a smaller lateral incision. Martin reports eight cases of treatment by this method—one was too recent to allow the end-result to be judged. In five of the remaining seven cases excellent end-results were obtained—in one necrosis of the upper anterior quadrant of the head developed, and in one other the nail was too long and worked through the head damaging the acetabulum. Badgley *et alii* report 34 cases of treatment by this method with poor results in about one-third.

Klein and others (1948 and 1949) recommend osteotomy through the epiphyseal plate, without sacrificing any of the neck. The head is then fixed by a Smith-Petersen nail as aforementioned. They report 16 cases with pronounced slipping treated in this way. After an average follow-up period of thirty-three and one-quarter months, the average index of motion was 85% of normal, and the average percentage of normal hip function was 92. In this series, traumatic arthritis was encountered, they state, in only two cases.

Personally I have not yet tried this method. I have not yet had the courage to try it because it would seem to be extremely difficult to effect reduction and at the same time avoid damaging the blood supply. I would particularly like to hear from members present here today as to whether they have used this method, and if so of their experiences with it. It seems to me to be the ideal method if one can be reasonably sure of performing it without further jeopardizing the blood supply.

In six cases with marked displacement I have performed intertrochanteric osteotomy and am well pleased with the results. The results cannot, of course, be perfect, because there remains a deformity due to fusion of the head in malposition to the neck. The head is brought back into its normal position in relation to the acetabulum, but a ridge remains at the upper and anterior aspect of the junction of the head and neck which may in later years cause changes in the joint. In addition, the neck is shorter than normal and there is some limitation of abduction and medial rotation movements. In all cases, however, the joint space has remained normal, a fact indicating that no avascular changes have taken place in the head, and all patients have a good range of movement with no pain and very little appreciable limp. The external rotation deformity and shortening have been overcome. One boy of twelve years won the broad jump at his school twelve months after operation. In only one of these cases was preliminary traction used. Skeletal traction in slight abduction and medial rotation was used for two weeks, but it had no effect whatever on the displacement. The patient then had subtrochanteric osteotomy performed and has since continued to do active farm work without any symptoms.

The osteotomy is carried out below the great trochanter and just above the lesser trochanter. It is transverse to the line of the shaft. Usually a small wedge has been removed to allow sufficient abduction. The leg is brought out into wide abduction and medial rotation varying with the degree of displacement. There is a tendency for the shaft to slide medially when the leg is medially rotated, and this can be prevented by spiking the upper end of the shaft into the spongy bone of the great trochanter. The position is held by a plaster spica. If there is any doubt with these children a double spica is used. In one case the angle of abduction was lost because of inefficient immobilization in a single spica, and a second osteotomy to restore abduction had to be performed. The final result was good. Union occurs in about twelve weeks, and movement is quickly regained.

I do not know what will be the condition of these hips in twenty-five years' time. Key, in a discussion which followed the reading of papers (already cited) by Martin (1948) and by Badgley *et alii* (1948), stated that arthritis would be produced by incongruity and not by nutritional changes in joints treated by this method. However, in the discussion, opinion was divided as to the relative merits of the two forms of treatment, and osteotomy through the neck of the femur was strongly condemned by some speakers. The best method of treatment is still *sub judice*, and only time and the combined experience of orthopædic surgeons who will report their results will finally decide the question.

Analysis of cases in this series is as follows. There were nine hips with mild slipping in which the epiphysis was nailed, the condition in one case being bilateral. Two hips with mild slipping were treated by continuous traction. Six hips with pronounced slipping were treated by osteotomy.

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EXPERIMENTAL PROSTATECTOMY IN A MARSUPIAL (TRICHOSURUS VULPECULA).

By V. S. HOWARTH, M.S., F.R.A.C.S.,

From the Gordon Craig Research Laboratory, Department of Surgery, University of Sydney.

MODERN investigations into the functions of the prostate gland have centred around studies into the biochemistry of its external secretion and into the enzymic activity of prostatic epithelium, especially with regard to acid phosphatase production. These investigations have led to remarkable advances and have opened up a new era in the treatment and control of carcinoma of the prostate by œstrogen therapy.

In spite of a vast literature on the prostate gland and the recent advances in clinical management of prostatic disease, Huggins (1946) with regard to the essential func-

tion of the gland was only able to say that the one known function is "liquefaction of the semen" and that everything else is mainly descriptive at the present time.

Many workers, employing a deprivation technique in varying laboratory animals, have tried to demonstrate a hormonal action by the prostate gland and a function apart from the purely mechanical one of contributing to the volume of the seminal fluids. Steinach (1894) extirpated the prostate and vesicular glands in white rats and found that the power of the animal to reproduce was abolished. Ivanoff (1900) was unable to confirm Steinach's work and concluded that the function of the accessory genital glands was a mechanical one, their secretions serving to suspend and act as a vehicle for the spermatozoa and to assure their passage to, and ejection from, the anterior part of the urethra. Serralach and Pares (1907) performed prostatectomy in dogs and concluded from their experiments that this procedure brought spermatogenesis to an end.

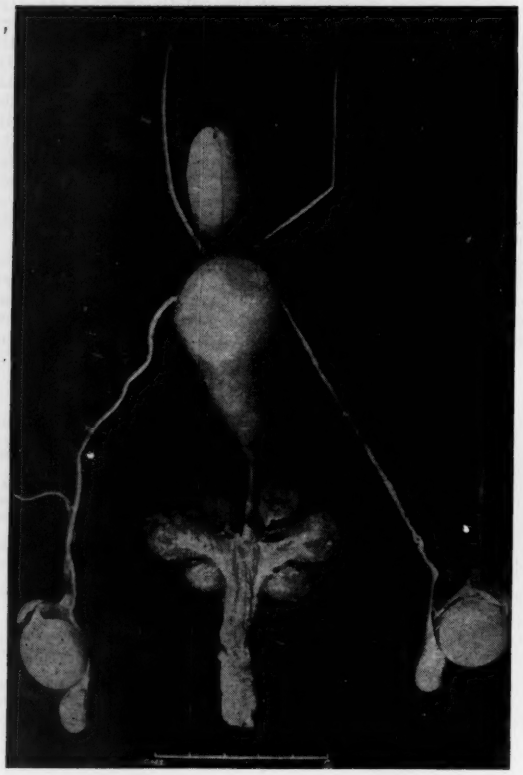

FIGURE I.

The bladder and accessory sex glands of *Trichosurus vulpecula* from the anterior aspect. Note the large cone-shaped prostate gland surrounding the proximal urethra.

They attributed this effect to testicular atrophy, which they could prevent by the administration of a glycerin extract of prostatic tissue by mouth, and they therefore postulated an endocrine function for the prostate. Walker (1911) repeated Steinach's work, with results which were in complete accord. Macht and Bloom (1921) and Macht and Ulrich (1922) removed the prostate gland from albino rats, but failed to detect any behaviour changes or alterations in neuro-muscular activity. Strauss (1942) found that removal of either the seminal vesicles or the prostate had no effect on the *libido* of the white rat or on the structure or function of the testes, but that prostatectomy was usually followed by atrophy of the seminal vesicles. Strauss concluded that either the prostate gland or the seminal vesicles are essential for natural impregnation in the white rat, for removal of both makes the animal sterile. Lawlah (1930), experimenting with guinea-pigs, found that prostatectomy had no macroscopic effect upon the testes or on the accessory sex glands.

The multilobular glands of rodents and similar laboratory animals do not render complete extirpation of the prostate gland a feasible laboratory procedure, and here technical difficulties have hindered long-term observations of the effects of experimental prostatectomy.

It was considered that the order Marsupialia, with their very large accessory sex glands, might show some difference from the behaviour of the Eutheria after experimental prostatectomy. Accordingly, an animal of this order, *Trichosurus vulpecula*, was investigated with this object in view.

Anatomy.

The anatomy of the accessory sex glands of the Marsupialia was first described by Cowper (1704), followed by Oudemans (1892), Disselhorst (1904), van den Broek (1910), MacKenzie (1919), Weber (1927), and Carrodus and Bolliger (1939). The anatomical arrangements described by these workers are illustrated in Figure I. The prostate gland is a large, cone-shaped mass, which may comprise as much as one-fortieth of the animal's body

FIGURE II.

The prostate has been severed from the bladder neck and from the urethra distal to the apex of the gland and is being removed by threading it proximally over a rubber tube, passing through the prostatic urethra to the external urinary meatus. Sutures have been inserted to anastomose the bladder neck to the urethra.

weight, but has been found to vary considerably in size in different animals and according to the season of the year in which observations are made. The gland is confined within a well-defined fibrous capsule. In contrast to what pertains in higher mammals the entire bladder receives a peritoneal coat and the upper two-thirds of the anterior surface of the prostate gland is also covered by this membrane. The prostate gland itself, on macroscopic examination, shows three definite areas. The most caudal portion of the gland is deeply pigmented and forms the greatest bulk of the organ. The intermediate zone is not pigmented, but can be differentiated from a proximal zone immediately adjacent to the bladder neck. On expression of the secretion from the prostatic tubules, naked-eye observation shows the secretion from each of these various

zones to be quite different. From the proximal and intermediate portion of the gland a transparent viscid fluid can be made to exude, while that from the pigmented portion is cloudy and opaque. Seminal vesicles are not

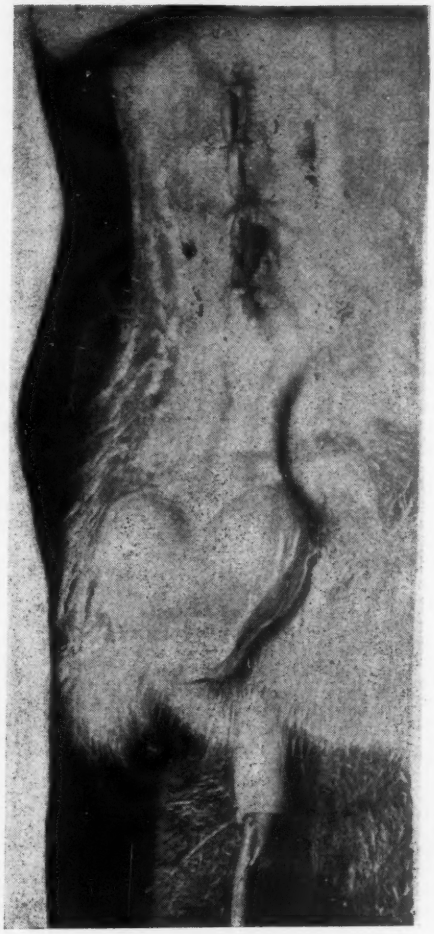

FIGURE III.
The abdominal wall following repair with drainage. Note the urethral catheter, the proximal end of which lies in the bladder cavity.

present in *Trichosurus vulpecula*. It was considered that this simple anatomical arrangement would lend itself to complete surgical removal of the prostate with restoration of the continuity of the urinary passages. This has been performed on 18 experimental animals of varying ages.

Technique.

Anæsthesia was induced with ether save in one instance in which the agent was "Dial" administered intraperitoneally. The lower abdominal area from the *symphysis pubis* to the mid-abdomen was shaved, and a mid-line incision was made between the epipubic bones extending upwards about two inches; the underlying abdominal muscles were incised, and the extraperitoneal fat in the vicinity of the pubis was removed to expose the peritoneum. The peritoneum covering the anterior surface of the prostate gland was retracted upwards. The bladder and prostate were then delivered into the wound. The bladder neck at the vesico-prostatic junction was then severed. A length of rubber tubing one-eighth of an inch in diameter was then inserted into the prostatic part of the urethra and advanced through the penile urethra until it emerged at the external urinary meatus. The prostate was then severed from its junction with the membranous urethra and removed by being threaded proximally over the inlying rubber tubing (Figure II). The proximal end of the rubber tube was introduced into the bladder cavity and the bladder neck was anastomosed to the membranous urethra by means of four fine catgut sutures. The abdominal wall was closed about a small rubber drainage tube placed down to the line of the anastomosis. The urethral catheter was fixed by means of a single silk suture placed through the *glans penis* (Figure III).

The wound drainage tube was removed forty-eight hours after the operation, and the urethral catheter on the fifth or sixth post-operative day, if it had not already been removed by the animal.

Results and Observations.

The results of the operation are summarized in Tables I and II. Eighteen animals were subjected to the experimental procedure, and of these seven died within periods of two to fifty-two days of the operation (Table I). The cause of death was commonly an acute urinary infection, though

TABLE I.
Deaths Due to Operative Procedure.

Animal.	Weight. (Kilograms.)	Weight of Tissue Removed. (Grammes.)	Survival. (Days.)	Cause of Death.
455	?	6	4	Acute urinary obstruction. Hydroureters. Hydronephrosis. Animal removed catheter on first day.
466	2·29	14	9	Secondary hæmorrhage. Bladder full of blood.
446	3·07	9·5	2	Animal did not recover from anæsthesia. (Overdose of "Dial".)
441	?	9·2	52	Subcapsular hæmorrhages in kidneys. Acute pyelonephritis. All organs pale.
467	2·3	10·3	4	Acute urinary infection.
471	1·05	0·05	15	Acute urinary infection.
459	1·80	1	5	Acute urinary infection.

in the one instance in which it was used "Dial" caused an anæsthetic death. One animal removed the drainage tube and died of acute urinary obstruction with retention of urine, bilateral hydroureters and hydronephrosis on the fourth day after operation. One animal died of secondary hæmorrhage on the ninth day. Eleven prostatectomized animals have been observed for periods of from 146 to 396 days (Table II). These animals quickly recovered from the operative procedure; the abdominal wound healed well, and fistula formation did not occur, the animals all passing urine naturally.

Recovery from the operation appeared to be complete in the animals that survived, their general behaviour being indistinguishable from that of controls. Secondary sex characteristics were well maintained, and there was no evidence of testicular or penile atrophy.

Periodic urine examination for the presence of spermatozoa were made, and the animals were electrically stimulated at intervals in order to procure a semen specimen (Howarth, 1949). After a final electrical stimulation they were killed with an overdose of ether, and complete post-mortem examination was carried out in all cases. Histological preparations were made and stained by hæmatoxylin and eosin. The tissues examined histologically were testes, epididymis, Cowper's glands, bladder neck, kidneys, suprarenal, thyreoid, pituitary, liver, spleen and paracloacal glands (Bolliger and Whitten, 1946). Smears were made of the contents of the tubules of the epididymis to observe the characteristics of the contained spermatozoa. The contents of the bladder and the posterior part of the urethra were also examined microscopically.

All the operated animals except one (and that an immature animal) passed spermatozoa in their urine as is normal for this animal (Bolliger, 1942), no morphological or other abnormalities in these spermatozoa being observed.

TABLE II.

Protocols of Prostatectomized Phalangers.

Animal.	Preoperative Weight. (Kilograms.)	Weight of Tissue Removed. (Grammes.)	Post-operative Spermatorrhœa.	Post-operative Ejaculate.		Survival. (Days.)	Body Weight *Post Mortem*. (Kilograms.)	Macroscopic Completeness of Operation. (Post-mortem Finding.)
				Volume. (Millilitres.)	Sperms.			
454	1·60	0·14	+	0·55	Few sperms.	211	1·8	Complete.
461	2·5	4	+	1·0	Motile sperms.	248	2·12	Complete.
462	1·6	1·5	+	0·5	Many motile sperms.	240	2·3	Complete.
464	2·38	5	+	0·5	No sperms.	146	2·57	Complete.
453	2·20	?	+	Not stimulated.		165	2·12	Two nodules of prostatic tissue at bladder neck.
431	3·15	7·5	+	0·5	Only occasional motile sperms.	320	2·80	Complete.
460	1·60	0·26	−	0·5		217	2·07	Complete.
456	?	6	+	2·0? Urinous ejaculate.	Sperms.	396	1·60	Complete.
465[1]	1·81	0·43	+	Nil.		217	1·82	Complete.
463[1]	2·7	4·8	+	Nil.		310	3·02	Complete.
457	1·0	0·120	+	0·5	Occasional motile sperms.	349	2·00	Complete.

[1] Cowper's glands removed.

The general effect of the electrical stimulus employed to procure a semen specimen was the same in the operated animals as in the controls, but in the operated phalangers more than 0·5 millilitre of fluid was seldom obtained. Control animals yielded five to ten millilitres, but sometimes up to 31 millilitres of semen on electrical stimulation. The gross and microscopic features of the emission in the operated animals were distinctly different from those seen in controls. In the prostatectomized phalangers the emission fluid obtained was viscous, transparent, serous and contained few spermatozoa, and showed no tendency whatever to clot. The bulk of this fluid was found to consist of the secretion of Cowper's glands. In two animals, 465 and 463, in which Cowper's glands as well as the prostate had been removed, it was impossible to obtain any seminal fluid on electrical stimulation. Following the final electrical stimulation smears taken from the posterior part of the urethra and bladder revealed numerous motile spermatozoa in these regions, and in animal 456, which yielded an emission of two millilitres, this was found to consist mainly of urine, so that it would appear that the numerous spermatozoa which had been delivered into the posterior part of the urethra on electrical stimulation were carried out in the urine discharged. The presence of the contractile mechanism of the prostate and the volume of its secretion would therefore appear to be essential for the delivery of spermatozoa to the anterior part of the urethra. In one animal, namely 461, a rope-like clot was found to occupy the posterior part of the urethra and this was histologically confirmed to consist of coagulated spermatozoa. After prostatectomy no obvious abnormalities have been observed in the spermatozoa.

At post-mortem examination of one phalanger, namely 453, the prostatectomy was found to be macroscopically incomplete (Figure IV). In no other instance was there any evidence of regeneration of prostatic tissue or was there any tissue present which could be recognized as prostate gland (Figure V).

Some animals showed evidence of chronic urinary obstruction due to stricture-formation at the site of the anastomosis of the bladder-neck with the urethra, and a slight degree of hypertrophy of the bladder and dilatation of the ureters was observed. In no instance, however, were the findings gross, and in two animals only was there evidence of marked renal damage, namely 456 and 431; these animals were sacrificed at the end of three hundred and ninety-six days and three hundred and twenty days respectively. In one animal, 465, two small calculi were found at the site of the anastomosis.

A careful microscopic examination of the bladder-neck was made in all animals, and even though prostatic tissue was macroscopically absent in all the animals save one, namely 453, in every instance prostatic tubules were found on the posterior aspect of the bladder-neck. This finding was to be expected in view of the fact that the *vasa deferentia*, which were obviously patent, run through the posterior aspect of the prostate very close to the bladder neck, and in all the animals, isolated prostatic tubules were seen on microscopic examination of this region. The prostatic epithelium in some of the slides examined demonstrated that these prostatic tubules were dilated, and the appearance suggested a quiescent and inactive state of the glands. The volume of prostatic tissue remaining, in relation to the total mass of the gland removed, would appear to be insignificant and incapable of compensating for the removed gland. Histological findings supported this view.

Histological slides from the testes showed active spermatogenesis, and no abnormality could be detected in the seminiferous tubules.

The epithelium of the epididymis was normal in all cases and its tubules contained masses of spermatozoa. Cowper's glands did not show any abnormality. The kidneys of animals 396 and 320 showed, as expected, fairly advanced changes of pyelonephritis.

Sections from the thyreoid, pituitary and suprarenal glands did not disclose any histological abnormalities. Liver and spleen also showed normal structure.

Discussion.

The technique employed for the prostatectomy described in this paper is essentially the retropubic radical operation described by Millin (1947) for removal of the human gland. It is noteworthy that the experimental animal survived a surgical operation of such magnitude and that complete healing of the urinary passages occurred without the formation of a urethral stricture or urinary fistula.

There has been considerable discussion as to the morphological significance of the prostate gland in the Marsupialia. Oudemans (1892) referred to this structure as a collection of urethral glands, while Van den Broek (1910) regarded the cephalic end as the true prostate gland, and considered that the larger part of the cone-shaped organ was formed of urethral glands. As mentioned before, three distinct areas can be seen with distinctly differing naked-eye appearances of the secretion from these anatomically distinct zones. The secretion from the cephalic and intermediate portion is clear and serous, while that from the caudal pigmented portion of the gland is milky and opaque.

The secretions from the three component portions of the gland all fluoresce with a bluish-green colour in ultra-violet light, but with differing intensities. Huggins (1946) states that the fluorescence of semen of higher mammals is due to a yellow pigment formed in the seminal vesicles. This yellow pigment could not be demonstrated in *Trichosurus vulpecula*. The total ejaculate of *Trichosurus vulpecula* initially also fluoresces with the same bluish-green colour, which later, after standing, changes to a green fluorescence.

Anatomically, *Trichosurus vulpecula* does not possess separate seminal vesicles whose secretion in animals such as the rat, guinea-pig and monkey, when mixed with the secretion of the specific coagulating prostate glands, forms a coagulum. Huggins (1946) assumes from this that the secretion of seminal vesicles forms the substrate for

seminal clotting. The semen of *Trichosurus vulpecula* within some thirty minutes of emission coagulates into a firm clot. If Huggins's view is correct, it is reasonable to assume that one of the three components of the prostatic secretion in these animals has the function attributed to the seminal vesicular secretion of other animals. It is thus possible that the prostate gland of marsupials represents the prostate, seminal vesicles and urethral glands of the higher mammals, the only accessory sex glands remaining to the animal after the "prostatectomy" described in this paper being the glands of Cowper.

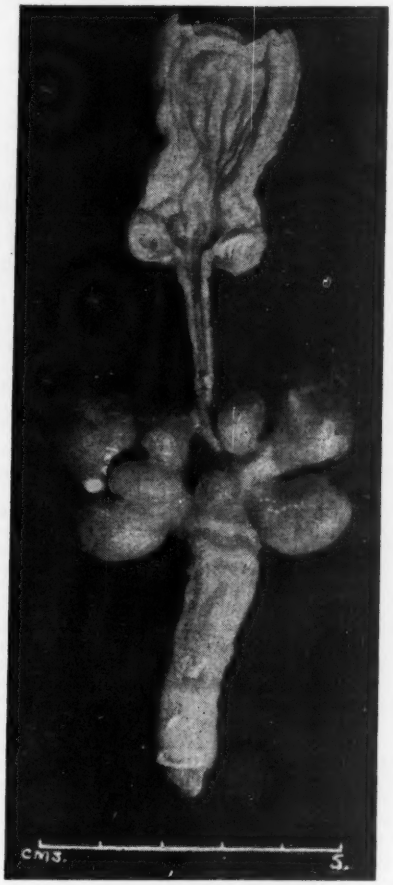

FIGURE IV.

The bladder, urethra, Cowper's glands and penis of animal 453. The bladder and proximal part of the urethra have been opened. Note the two nodules of prostatic tissue which remained on each side of the bladder neck, also the absence of a stricture at the site of the anastomosis of the bladder to the urethra.

The prostate gland in *Trichosurus vulpecula*, after the liver, is the largest organ in the peritoneal cavity. However, its removal has no apparent effect on the general well-being of the animal, or on the primary and secondary sex characters as indicated by testicular size, penile development, and the coloration of the sternal area, while the development of these characteristics in immature animals is not hindered. The body weight of operated animals is well maintained, and the immature grow and develop spermatogenesis.

The most striking change following prostatectomy is the inability of the phalanger to discharge seminal fluid on electrical stimulation. After electrical stimulation the secretions from Cowper's glands only are obtained, and this small volume of fluid contains few or no spermatozoa. The gross and microscopic features of this secretion are quite different from normal seminal fluid, and it exhibits no tendency to clot.

Observations during life and post-mortem examinations show that spermatozoa are delivered from the testes and epididymis into the posterior part of the urethra and bladder of the prostatectomized animals in these experiments. Although spermatogenesis was unimpaired, it has not been possible to determine as yet the fertilizing power of spermatozoa after prostatectomy.

It would therefore appear that the main function of the prostate gland in the marsupial is to provide a fluid vehicle for the spermatozoa and by its muscular contraction to expel the resulting mixture into the anterior part of the urethra.

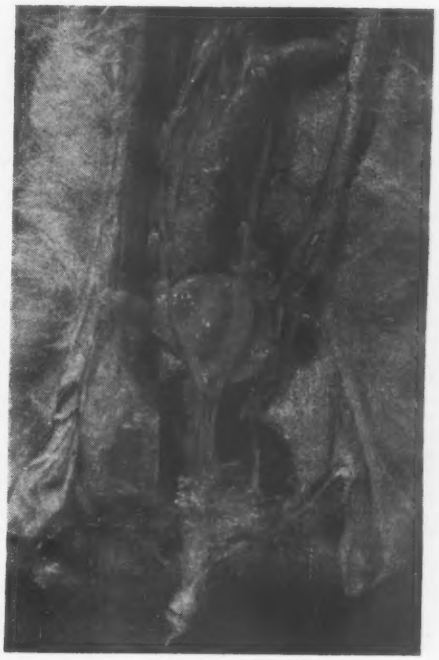

FIGURE V.

A post-mortem dissection illustrating the typical findings following prostatectomy; the bladder and proximal urethra have been opened. Note the absence of prostatic tissue. The bladder is normal, and the ureters are not dilated. There is no evidence of urethral stricture.

The fact that motile spermatozoa indistinguishable from normal can be obtained from the posterior part of the urethra after prostatectomy would seem to indicate that any effect of the gland itself upon the morphology and motility of spermatozoa is minimal.

Summary.

1. A technique has been described for prostatectomy with reconstitution of the urinary passages in a marsupial (*Trichosurus vulpecula*), and the operation has been performed on 18 animals of varying ages. The gland in *Trichosurus vulpecula* may constitute one-fortieth of the animal's body weight.

2. The majority of animals recovered completely with normal urinary function, and observations were extended over periods of from one hundred and forty-six days to three hundred and ninety-six days.

3. Primary and secondary sex characteristics were well maintained, and the general condition of the animals remained good.

4. Regeneration of prostatic tissue did not occur.

5. Spermatogenesis was unimpaired, and the morphology and motility of spermatozoa were not altered.

6. The morphological significance of the "prostate" in Marsupialia is discussed.

7. The only functions of the prostate discernible from the study of this marsupial are the provision of a vehicle for suspension of the sperms, and the delivery of the mixture to the anterior part of the urethra by its muscular contractions.

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CONCERNING CALCINOSIS CIRCUMSCRIPTA, WITH REPORT OF A CASE.

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CALCINOSIS CIRCUMSCRIPTA is the name given to the condition of localized deposits of calcium salts in the subcutaneous tissues and skin. The lesions are usually in the fingers. In 1942 a review of the literature by Prosser Thomas indicated that about 230 cases of calcinosis had been reported, and of these about two-thirds were of the localized type. The first case was recorded by Weber in 1878.

Pathological Classification.

To understand the relation of calcinosis to other forms of calcification in the soft tissues, the following guide to the different types is set out.

1. Metastatic calcification. This is a rare condition of disordered calcium metabolism and is usually associated with hypercalcæmia and osteoporosis. Deposits of calcium salts occur in places other than the subcutaneous tissues; for example, the viscera. These lesions are seen in hyperparathyreoidism, some cases of chronic nephritis, multiple myeloma, bone carcinoma, and hypervitaminosis *D*.

2. Dystrophic calcification. This is a common condition in which lime deposition occurs in dead or degenerated tissues anywhere in the body. There is no associated hypercalcæmia or osteoporosis. Common examples are phleboliths, calcified tuberculous nodes, and calcification in degenerating tumours.

3. Calcinosis. This is a rare condition in which the calcification is limited to the skin and subcutaneous tissues only, and there is no hypercalcæmia and usually no osteoporosis. Two forms are described: (*a*) *Calcinosis universalis*, in which there are multiple and widespread subcutaneous deposits of calcium. It occurs mainly in children, the sex ratio being equal, and has a gloomy prognosis as it results in ulceration, deformity, impairment of general health and commonly death from intercurrent infection. A few cases have been reported in which the deeper fascial planes in the body were involved. (*b*) *Calcinosis circumscripta*, in which there are fewer deposits, mainly confined to the upper limb, especially to the tissues about the small joints of the fingers. Deposits may also occur at the elbow and knee, and are usually bilateral. This form of calcinosis is twice as common as the generalized form. In Steinitz's series (quoted by Brooks, 1934) of 105 cases of calcinosis, 71 were of the localized type and 34 of the universal type. It occurs predominantly in women over thirty years of age and the sex ratio is six to one. The prognosis is much better than in the universal form.

So-called intermediate types have been described.

The deposits are composed of tricalcium phosphate, $Ca_3(PO_4)_2$, with which may be associated calcium carbonate.

Clinical Features.

The onset is insidious, the earliest symptom being slightly tender areas in the fingers, which slowly progress to small, mobile, hard lumps, which later may become fixed to the underlying fascia. The overlying skin becomes erythematous and perhaps painful. Subsequently ulceration and discharge of small gritty pieces of lime occur, to be followed by healing with scarring.

The common sites for these granular depositions of calcium salts are the flexor aspects of the terminal phalanges and peripheral finger joints. The lesions may result in slight limitation of movement of the adjacent joint, but are usually not painful unless forced movement is attempted.

The disease slowly progresses until a stationary phase is reached, wherein some of the ulcers heal after discharging the calcium whilst new deposits form elsewhere in the hands.

The diagnosis is established by radiological examination when the very dense granular deposits of calcareous material are revealed in the subcutaneous tissues. The results of laboratory investigations of serum calcium and phosphorus contents, and of the urinary calcium content, are usually within normal limits.

Associated Conditions.

Many cases of *calcinosis circumscripta* are found in conjunction with other disorders, as follows.

1. Raynaud phenomena are very commonly associated and vary from mild cold fingers to true Raynaud's disease. The latter has only once been complicated by calcinosis, according to Allen, Baker and Hines (1947), but many women with calcinosis will give a history that for years they have had symptoms of peripheral vascular disorders of various degrees of severity.

2. Scleroderma or sclerodactylia, with or without telangiectases and pigmentation, is also often coexistent with calcinosis. Bolam (1939) states that one in 60 subjects of scleroderma has calcinosis. In Brooks's (1934) series of 121 cases, 38 were associated with scleroderma or sclerodactylia, and this was similar to Steinitz's series (quoted by Brooks, 1934) in which one in three cases of *calcinosis circumscripta* were thus associated. Raynaud's phenomena may also occur in scleroderma but are probably coincidental.

3. Other conditions sometimes found with calcinosis of both types are trophic changes in the phalanges, lower œsophageal spasm, and myasthenia (Klein, 1946).

There are, of course, many cases of *calcinosis circumscripta* without these associations, and there are still far more cases of these other conditions without calcinosis.

Differential Diagnosis.

There are two conditions which are much more common, and which superficially have some resemblance to this disease and may cause delay in diagnosis. The first is a subacute subcutaneous inflammatory process due to pyogenic organisms, but it is noted that chemotherapy is without effect, and if the affected area is incised no pus is found. The second condition which has a faint resemblance is gout, but the resemblance is very superficial indeed. The diagnosis is made on the radiological appearance, which is quite typical, but which must not be confused with the other forms of calcification described.

Report of a Case.

In November, 1949, Mrs. E.B., a farmer's wife in southern Tasmania, presented herself complaining that she had sore lumps on the fingers of her right hand. She stated that she had had these for about one year, and that they had been regarded as an infection by her local doctor, who had incised several without any improvement. Later questioning elicited the fact that she had often noticed that the distal half of all her fingers went white after several minutes' immersion in cold water, and that her finger tips were always bluish-coloured in winter. She had had no numbness, tingling or pain in her hands.

On examination of the patient it was found that she had multiple reddened lumps on the fingers of both hands, predominantly on the flexor aspect about the interphalangeal joints. There was also a similar lesion in the pulp of her right little finger and in the first web of her right hand. The lumps were slightly tender, caused some limitation of joint movement, and were not fixed to the bone or to the joint capsule. There were patches of thickened skin about one centimetre in diameter over the metacarpo-phalangeal joints of the left hand, and over the dorsum of the middle metacarpo-phalangeal joint of the right hand. There was a small lump over the right tibial tuberosity. There were several small unpigmented areas of skin about half a centimetre in diameter over the face and forearms. There was no myasthenia. General examination revealed no other abnormality. At the first examination, on a cold day, her fingers were slightly cyanotic. At a subsequent examination, on a warm day, there appeared to be good circulation in the fingers, until they were immersed in cold tap water, when a few pale areas appeared. At this time she said that the water was not cold enough to blanch her fingers.

This patient's condition was initially regarded as infective in origin, and a course of penicillin was given without effect. A physician in consultation regarded it as probably a chronic staphylococcal infection involving periosteum. An X-ray examination resulted in the diagnosis being established (Figure I). The radiologist reported as follows:

> Localized granular calcareous deposits are present in the soft tissues of the digits, typical of *calcinosis circumscripta*. The bones and joints in the neighbourhood appear normal.

Further radiological investigation of the rest of the patient's body showed no abnormality of calcification in the chest, abdomen, skull or feet, but revealed granular calcifications in the regions of both tibial tuberosities, greater on the left side, typical of *calcinosis circumscripta*. There were also lesions in the left hand similar to those reported above in the right hand. X-ray examination with a barium bolus indicated that there was no œsophageal delay, although the patient said food often seemed to stick in her gullet.

Investigations on the blood were carried out; they revealed a total erythrocyte count of 4,740,000 per cubic millimetre, a total leucocyte count of 6950 per cubic millimetre, and a hæmoglobin value of 14 grammes *per centum*. The film appeared normal, and platelets were present in normal numbers. The bleeding time (Duke) was three minutes, the coagulation time (capillary) was five minutes, the prothrombin index was 100%, the serum calcium content was 10·5 milligrammes per 100 millilitres of serum and the serum inorganic phosphorus content was 4·4 milligrammes per 100 millilitres of serum.

Since the patient was first examined three months ago, several of the lumps have discharged a few granules of calcium salt with coincidental secondary infection, which cleared up with glycerin dressings.

Discussion.

Very little is known about the ætiology or pathology of calcinosis and consequently little progress has been made as regards treatment. Writers on the subject have held conflicting views as to whether or not preliminary degeneration or necrosis precedes the deposition of calcium salts in and around the subcutaneous fat cells. Thannhauser (quoted by Brooks, 1934) considered that the commonly associated circulatory upset with failing local nutrition was responsible for local tissue changes preceding calcification. Brooks (1934) concluded that some undetermined local tissue change, possibly due to trauma, caused local fibrous tissue damage, which was followed by calcium deposition, which in turn gave rise to a chronic inflammatory process. Brooks also intimated that the common association of relatively uncommon vascular conditions suggested a single underlying cause. Prosser Thomas (1942) concurred with this by saying that calcinosis did not seem to be a primary condition, but a manifestation of a systemic morbid complex.

Collagen metabolism is still obscure, and hence the factor responsible for the deposition of calcium is possibly still unknown. Bolam (1939), quoted by "The British Encyclopædia of Medical Practice", states that there is some evidence for local saponification of fats. Best and Taylor (1945) incline to the theory that the occurrence of local areas of devitalized tissue with minimal carbon dioxide production results in areas of increased local alkalinity, and that this favours the deposition of calcium salts.

Metabolic studies have been inconclusive, because although the blood serum calcium and phosphorus levels are usually within normal limits, these estimations alone do not necessarily mean that calcium balance is normal. In a few cases of generalized calcinosis complete calcium balance studies were carried out, and in several of these slight calcium retention was demonstrated.

Speculation has also involved the endocrine glands, notably the parathyreoid and thyreoid, for possible ætiological significance, but so far there has been no evidence to support their consideration. It has been said that the incidence of localized calcinosis in middle-aged women approaching the menopause is suggestive of an endocrine factor.

In consideration of the known clinical facts, the following points seem to the author to be of significance.

1. The differences in the age and sex ratios in cases of *calcinosis universalis* and *calcinosis circumscripta* suggest that these are two separate diseases.

2. In *calcinosis circumscripta* the deposits are well localized and discrete, which suggests that there must be a local factor involved.

3. The great majority of patients with peripheral vascular diseases do not exhibit calcinosis, and many patients with calcinosis show no evidence of any vascular disorder; hence vascular changes alone are not responsible for the condition, but their frequent presence in cases of calcinosis appears to be more than coincidental, and they probably play some part in the ætiology.

4. The occurrence of deposits about the knees, elbows and webs of fingers, where the manifestations of vascular spasm are less than in the fingers, suggests that if the lesions are due to local ischæmia, this ischæmia may not be due to spasm alone.

5. The peripheral and superficial distribution of the lesions, mainly about the fingers, knees and elbows, and never in the toes, suggests that some part in ætiology may be played by (*a*) the progressive decrease in diameter of peripheral blood vessels, (*b*) the lowered skin temperature of exposed parts, (*c*) slight trauma, as occurs in housework.

6. The random distribution of deposits in the fingers is reminiscent of embolic or thrombotic phenomena.

7. The final state reached of healing of old lesions whilst new ones appear is also suggestive of a continuous underlying process, such as embolism, thrombosis or some other abnormality of the blood.

It is suggested, therefore, from a consideration of these facts, that in *calcinosis circumscripta* there are a number of factors which play a part in initiating the local tissue change, which may, in some cases, proceed to calcification. The chief factor appears to be vascular blockage, perhaps by minute emboli or thrombi, due to a decrease in the lumina of the vessels concerned. This reduction in size of the vessel may be due to spasm precipitated by cold, trauma or central vasomotor overactivity, or simply due to the decreasing size of the vessels in the peripheral parts of the body.

It is well known that Raynaud phenomena of varying severity are fairly common amongst women living in the colder climates, and this is thought to be due to an increased sensitivity of the vasomotor centre to cold stimuli. It has been shown, as pointed out by Forbes (1947), that a few such patients may show autoagglutination in their blood at lowered temperatures, and that the resulting masses of agglutinated erythrocytes may block the small vessels until warmth reduces the spasm and disperses the agglutinated corpuscles. It is not hard to follow this up by supposing that such a person, who has mild Raynaud phenomena in cold weather, may, by the time several wintry months have passed, have had a very inadequate blood supply to various areas in the exposed fingers for periods up to six hours or more per day due to small erythrocyte emboli caused by these cold autoagglutinins. This prolonged ischæmia of a small localized area of tissue could readily result in degeneration, if not necrosis, of such areas and may in some cases proceed to calcification.

There are also other blood disorders which may have some bearing on the blockage of vessels in cases in which no spasm has been observed. In certain conditions—for example, multiple myeloma, in which calcinosis can occur—it has been demonstrated that a sludging process occurs in the blood with resultant embolus or thrombus formation. There is also the rare condition of thrombophilia, in which the prothrombin time is lowered, and in which spontaneous thromboses result.

It would seem reasonable to postulate that the initiating factor in *calcinosis circumscripta* is vascular block by agglutinated red cells, or emboli or thrombi, and that this may be precipitated by cold, trauma or spasm. This block, if prolonged, may result in local tissue damage, which may proceed to fibrosis, or in some cases to calcification.

This theory would be compatible with the rarity of calcinosis in cases of Raynaud's phenomena, and yet explain the frequent association of such phenomena with *calcinosis circumscripta*.

Further studies of the blood state, and of tissue biopsies about the lesions, are required to prove or disprove these ideas. Such studies were unfortunately not able to be carried out on the patient in the case reported.

Treatment.

Brooks (1934) states that spontaneous cures are not unknown, but he does not give the circumstances, such as perhaps moving to a warmer climate or changing of occupation.

It has been suggested that improvement might result from either limiting the calcium intake or increasing the calcium output. Efforts to raise the calcium excretion from the body are prone to result in generalized decalcification of the skeleton, and are therefore not favoured. Limiting the calcium intake and giving alkaline sodium phosphate (Na_2HPO_4), results in competition between the bones and the lesions for any available calcium. This latter method did produce some improvement with decalcification of the deposits in one case of *calcinosis universalis* of Brooks (1934). He also found that the maintenance of acidosis by a ketogenic diet or by exhibition of ammonium chloride (NH_4Cl) resulted in some improvement.

Leriche has suggested that a preganglionic sympathectomy may give relief, as it does in Raynaud's disease, and if vessel spasm is a factor in the ætiology this may be sound, if the condition is severe enough to warrant the operation.

The main treatment at present is symptomatic—that is, the minimizing of secondary infection when ulceration occurs, the protection of the hands from cold, and the relief of any pain if present; if necessary, a curettage of the deposit may help.

The final and effective method of treatment depends on the elucidation of the ætiology, and if the condition is due to vascular blocking by cold autoagglutinins, the only hope may be a change to a warmer environment.

Summary.

The pathological classification and clinical features of *calcinosis circumscripta* are presented.

The features of and investigations carried out on such a case are recorded.

A review is made of present-day knowledge on the subject, and a suggestion as to ætiology is advanced.

The treatment is mentioned.

Acknowledgements.

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Reports of Cases.

PARINAUD'S SYNDROME: REPORT OF TWO CASES.

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A PARALYSIS of conjugate deviation of the eyes in the vertical plane (Parinaud's syndrome) is a common sign of tumour in the region of the pineal body. It was a presenting sign in five of eight cases reported by Gladstone and Wakeley (1940).

Usually, upward movement only is restricted; palsy of downward movement only, or of all movement in the vertical plane, is rarer. As a rule, the pupillary reactions are abnormal; they may be inactive, or they may react to light but not to accommodation. Other signs of mid-brain involvement may complicate the picture.

The mechanism underlying the syndrome is uncertain. Gladstone and Wakeley (1940) describe it as a nuclear lesion, the separate nuclei of the oculomotor group being involved progressively from before backward—first the pupillomotor cells, then the nuclei of the superior recti, and ultimately the whole group. However, Walsh (1947), quoting earlier workers, attributes the syndrome to pressure on supranuclear centres in the superior colliculi, and this view is more acceptable. Patients unable to elevate their eyes voluntarily, often do so involuntarily when shutting the eyes (Bell's phenomenon). However, direct involvement of the oculomotor nucleus may occur with a pineal tumour.

The usual cause of Parinaud's syndrome is a pineal neoplasm; the following two cases are presented as illustrations of the syndrome, and because of the possibly unique pathology in the first case.

Clinical Records.

CASE I.—J.D., a tram driver, aged thirty-eight years, was admitted to the Royal Adelaide Hospital on November 8, 1948. He complained of a small lump, increasing in size, in the left groin, noticed six days previously. His general health was good and there were no other symptoms. He presented as a healthy-looking, well-nourished man, with a tumour the size of a pigeon's egg below the left inguinal ligament and half an inch medial to its midpoint. No abnormalities were found in the central nervous, cardiovascular or respiratory system. At exploratory incision on November 10 the tumour was found to be a mass of enlarged superficial inguinal glands.

Dr. J. Orde Poynton reported as follows on sections of these glands:

> The normal architecture is replaced by a diffuse proliferation of medullary cells among which are a number of uninuclear giant cells. There is a slight increase of eosinophils. The gland capsule is intact. Appearances are consistent with an early stage of acute Hodgkin's disease.

Post-operative convalescence was uneventful, and X-ray films of the pelvis and chest made at this time revealed no abnormality.

In January, 1949, the patient was given a course of 26 milligrammes of nitrogen mustard in four equal daily doses intravenously, though at this stage only one gland was palpable, and that doubtfully.

In February, he complained of pain in the left mid-abdominal region and back; he began to vomit in the mornings, and also after food, and in March enlarged glands were found in the neck, the groins and the right axilla. Deep X-ray therapy was given to these areas and to the abdomen in April.

In April, the patient fairly suddenly developed right temporal headache and visual difficulties; he said that "nothing looks straight". He also complained of breathlessness, poor sleep, cough and constipation. He was readmitted to the Royal Adelaide Hospital on April 26.

On examination, he had obviously lost weight. The pupils were regular but unequal, the left being greater than the right. The reaction to light was poor, and that to accommodation was absent. Nystagmus to the right was present, with inability to elevate the eyes voluntarily. When the lids of the closed eyes were lifted, the eyeballs were found to be rotated upwards. The fundi were normal. The knee and ankle tendon jerks were equal and active; there was a doubtful Babinski response on the right side. No other neurological abnormalities were recorded. The cardiovascular and respiratory systems were normal, save for a low blood pressure of 90 millimetres of mercury, systolic, and 40 millimetres, diastolic. Numerous enlarged glands were found in the groins, axillæ and cervical triangles, where they were extremely tender, and subcutaneously on the abdominal wall.

A second course of nitrogen mustard was given. The results were dramatic: at the end of the four days' treatment the glands were almost normal in size, the fever which the patient had shown had subsided, and the paralysis of conjugate elevation had entirely recovered. A blood examination at this time revealed an erythrocyte count of 4,700,000 per cubic millimetre and a leucocyte count of 3900 per cubic millimetre; the differential leucocyte count showed that 72% were neutrophile cells, 9% were lymphocytes, 8% were monocytes and 11% were eosinophile cells.

This notable remission was very short-lived. Ten days after the end of the course, the man developed severe pain in the region of the left ear, shooting over the head, and lasting perhaps five minutes. It attacked him some twenty times a day. He was unable to move his head because of pain. He also vomited frequently.

On examination of the patient on May 12, the same optic signs were noted—paralysis of conjugate elevation and of pupillary reactions. No other neurological signs were found; the *fundi oculorum* were normal. Only a few small glands were felt.

At least two epileptic seizures are recorded in the notes of this period, one with twitching of the right arm.

At lumbar puncture the pressure of the cerebro-spinal fluid was 150 millimetres of water, and after this his headache and optic palsy were slightly relieved.

Biopsy of an inguinal gland on May 23 revealed active reticulum-cell proliferation, with mitoses, more characteristic of a reticulum-celled sarcoma than of classical Hodgkin's disease. There were numerous multinucleate and uninucleate cells in the sinuses of the lymph gland.

Early in June a third course of nitrogen mustard was given, this time without any improvement. X-ray examination of the chest revealed a large pleural effusion and opacities in both lungs consistent with Hodgkin's disease.

On June 7 the man died. From the onset of symptoms he had lived just over seven months; the Parinaud's syndrome (which since its appearance had been attributed to a deposit in the pineal region) had been present intermittently for less than two months.

Autopsy revealed generalized and horrible sarcomatosis. There were enlarged glands in the axillæ, in the groins and in both cervical triangles. Subcutaneous deposits were present in the lower part of the abdomen. The mediastinum, hilar glands and pleuræ were heavily affected, and bilateral pleural effusions were present. Deposits of various sizes were seen in the intestines, the pancreas, the myocardium, the kidneys, the right suprarenal gland, the spleen, and to a relatively minor degree the liver. The mesenteric and omental glands were involved, and there were deposits on the vault of the bladder. The thyreoid, the pituitary and the testes were normal.

The brain was hardened with formalin. The *dura mater* and pia-arachnoid was grossly normal; slight internal hydrocephalus was present.

The pineal gland was entirely replaced by a tumour, about two centimetres in diameter, smooth externally but

with a necrotic centre. It was obviously pressing upon the mid-brain, and there was wide separation of the habenulæ (Figure I).

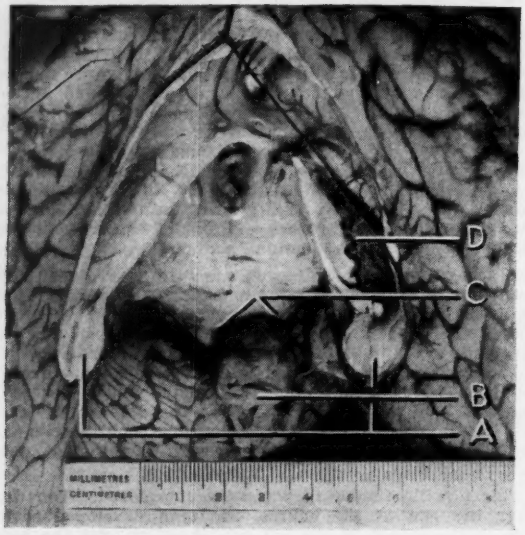

FIGURE I.
The *corpus callosum* has been divided and the hemispheres have been separated to demonstrate the pineal tumour. *A*, cut surface of *corpus callosum*; B, pineal tumour; *C*, superior *corpora quadrigemina*; *D*, chorioid plexus.

Microscopic examination of various deposits revealed a uniform picture. The growth was exceedingly malignant, with uninucleate and multinucleate cells, invading or

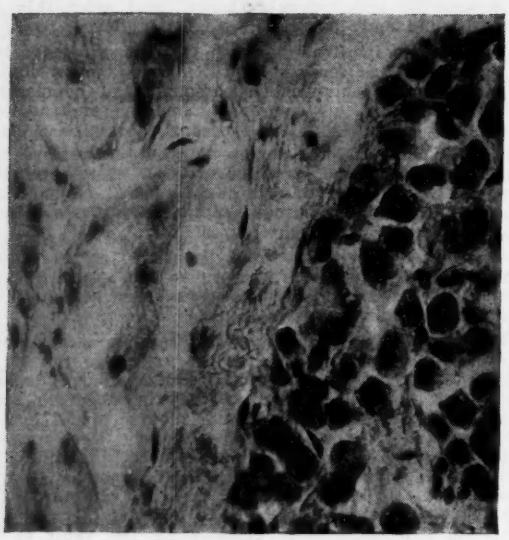

FIGURE IIA.
Section of a deposit in the kidney. (×520.)

compressing the surrounding tissues. In the pineal deposit, no normal pineal parenchyma could be seen, though several small psammoma bodies were present. Figure II illustrates the uniformity of the histopathological picture of the pineal tumour with that of a deposit in the kidney. Figures IIA and IIB show an identical histological picture of reticulosarcoma.

CASE II.—W.G.L., a farmer, aged sixty-two years, was first examined on March 18, 1949. He had always enjoyed good health until about June, 1948, when he noticed that he was gradually becoming weaker. Three months before presenting himself he had developed impotence, and during the last month he had gained one stone in weight. He attributed the latter to the development of a "ravenous appetite". For six weeks there had been some disturbance of vision. This first became obvious when he failed to gather the coins nearest him when collecting change on a counter. Subsequently he noted inability to look downwards and also intermittent double vision. For three months he had suffered an occasional headache. His wife stated that over the preceding six weeks he had become "different in every way". He had become over-emotional and would burst into tears on the slightest provocation —for example, merely on seeing his children. He would engage strangers in conversation, whereas previously he had been of a retiring disposition. From being a quiet,

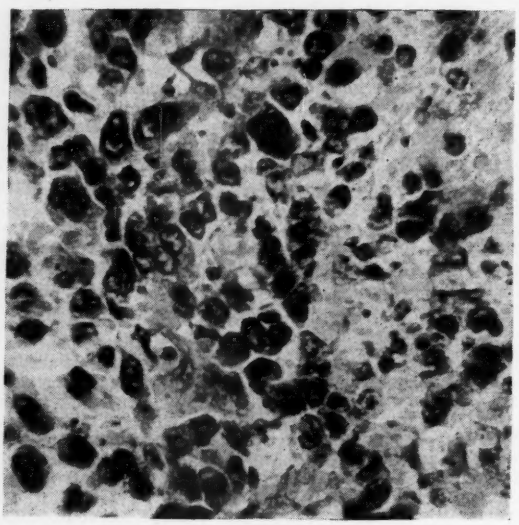

FIGURE IIB.
Section of the pineal tumour. (×520.)

modest man he had become an incessant talker and would often sing while walking in the street, a thing he had never been known to do previously. His wife noted that his speech was slurred at times, though the subject of his speech was always sensible. She commented that he seemed unaware of the seriousness of his visual and other symptoms.

On examination, the patient presented as a large, muscular man, with most pronounced euphoria; he was loquacious and had a tendency to facetiousness. The left pupil was larger than the right; both pupils reacted briskly to light, but sluggishly to accommodation. The axes of the eyes were slightly converged so that diplopia resulted, though conjugate and individual lateral and medial movements were of normal range. He was totally unable to elevate or depress the eyes voluntarily, though there was slight upward movement of the eyebrows when he attempted to look up. When vision was fixed on a torch light and the head was slowly flexed, then the eyes rotated up. Likewise digital retraction of the upper lid showed that the eyes were rotated up when the eyes were shut (Bell's phenomenon). When he attempted to fix his

eyes on an object, there was diminishing side-to-side movement some three or four times before fixation occurred.

General medical examination and detailed neurological examination revealed no other abnormality. Function of all other cranial nerves was normal. Muscle tone, strength and coordination were normal and there was no alteration to sensation of pin-prick, touch, pain, high temperature, joint position or vibration. Romberg's sign was absent, but at times the patient had a slight tendency to stagger when walking. Examination of the fundi revealed no abnormality. X-ray examination of the chest revealed no abnormality.

At lumbar puncture the cerebro-spinal fluid was under a pressure of 220 millimetres of water. The fluid was clear and colourless and contained five lymphocytes per cubic millimetre and 40 milligrammes of protein per 100 millilitres. Lange's colloidal gold curve was represented by the figures 3332100000. The Wassermann test produced no reaction with the blood or cerebro-spinal fluid.

A ventriculogram prepared by Dr. L. C. E. Lindon on March 3 revealed commencing symmetrical dilatation of the lateral ventricles and some dilatation of the third ventricle with air in the suprapineal recess and a filling defect in the region of the pineal gland. Air was present in a normal small aqueduct and in the fourth ventricle. At right subtemporal decompression performed on April 7 the intracranial tension was found to be increased.

Decompression was followed by a course of deep X-ray therapy. By the end of June there were no headaches and papillœdema had not developed, but there had been no change in the eye signs. The patient's walking was still unsteady, and he had been singing and whistling boisterously in the waiting room immediately prior to the interview.

Thereafter his condition steadily deteriorated. He became drowsy and lost interest in everything. His gait became more unstable and memory and orientation rapidly deteriorated, so that he no longer recognized his wife and children. Then he developed spastic paraplegia, became comatose and died at his home on August 28. No autopsy was performed.

Comment.

Both cases are excellent examples of Parinaud's syndrome with very few other signs of disease of the central nervous system at the onset of the syndrome. As is usually the case, both were due to pineal tumours. The first case is notable in that a study of the available literature shows no other case of involvement of the pineal body by reticulosarcoma. Such an occurrence must be extremely rare; very few cases of metastatic invasion of any kind are recorded (Willis).

A noteworthy feature of the second case was the gross personality change. This and the euphoria were attributed to cortical atrophy secondary to intermittent partial obstruction of the aqueduct of Sylvius. It is unlikely that obstruction was ever complete for a significant time, because of the absence of papillœdema and because at ventriculography injected air had entered the fourth ventricle.

Summary.

Parinaud's syndrome implies the loss of voluntary movement of the eyes in the vertical plane. The underlying lesion is probably supranuclear and most cases are due to tumours of the pineal gland. Two such cases are reported. One was caused by metastatic deposits of reticulosarcoma in the pineal gland, a condition not reported previously, while the other was due to a tumour in the region of the pineal body.

References.

Gladstone, R. J., and Wakeley, C. P. G. (1940), "The Pineal Organ", London.

Walsh, F. B. (1947), "Clinical Neuro-Ophthalmology", Baltimore.

Willis, R. A. (1934), "The Spread of Tumours in the Human Body", London.

HYDATID CYST OF THE DIAPHRAGM.

By M. P. SUSMAN,
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HYDATID CYSTS are not uncommon in muscles, especially those of the trunk, neck and proximal parts of the limbs; according to Dew (1928) they form 5% to 6% of all cysts. He does not mention the diaphragm as a site, and a search for references shows its rarity.

Clinical Record.

A man, aged sixty-three years, complained of recurring attacks of pain in the lower part of the right hemithorax, a dry cough, recent loss of weight and moderate dyspnœa on exertion. He said that he had coughed up blood in 1917 and 1940. His general condition was good, there were no physical signs of disease, bronchoscopy showed

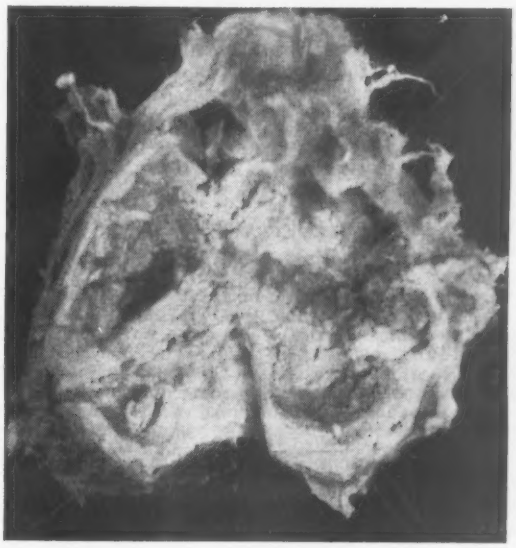

FIGURE III.

The cyst has been cut through and opened out. The surrounding tissue consists of a fringe of diaphragm and pericardium.

no abnormality and there was no reaction to the usual tests for hydatid infection and syphilis. Skiagrams showed a dense, rounded opacity in the lower and anterior part of the right side; it blended with the pericardial shadow (Figures I and II). Bronchograms showed some dilatation of the basal bronchi around the opacity, but no oil entered the opacity itself.

Thoracotomy was advised in the expectation that a neoplasm or hydatid cyst of the lung would be found.

The chest was opened through the fifth rib bed from the transverse process to the anterior axillary line. The lung was everywhere adherent by a fine bloodless film of tissue, which was easily separated. There was a hard mass in the cardio-phrenic angle; it was firmly embedded in the diaphragm and adjacent part of the pericardium, and loosely attached to the middle lobe, from which it was easily separated. An incision was made through the diaphragm close to the mass; neither the diaphragm nor the mass was connected to the liver, which looked and felt normal. The incision in the diaphragm was carried around the mass, and a segment of pericardium was removed with it. The pericardium was left open, the diaphragm and chest wall were closed with interrupted

sutures of linen thread, and a tube was inserted for closed drainage of the pleural cavity. The patient left hospital well three weeks later.

The mass was two inches in diameter and consisted of a hard fibrous and calcareous wall; the contents were turbid fluid and necrotic debris (Figure III). Microscopic examination confirmed that it was a degenerated hydatid cyst.

Reference.

Dew, H. (1928), "Hydatid Disease".

REPORT OF A CASE OF CALCINOSIS CUTIS ASSOCIATED WITH RAYNAUD'S DISEASE.

By JOHN RAE, M.B., B.S., D.D.M.,
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CALCAREOUS DEGENERATION can ocur in inflammatory swellings, in fat lobules, in dermoids, and in neoplasms. The term *calcinosis cutis*, however, is usually used to refer to the deposition of calcium salts in the skin and subcutaneous tissue, either in association with absorptive bone lesions (metastatic calcinosis) or as a result of some disturbance of calcium metabolism (metabolic calcinosis). True *calcinosis cutis* is an uncommon condition, and its occurrence in association with Raynaud's disease is rare. The following case is of interest.

Clinical Record.

The patient, a married woman, aged forty-eight years, has suffered from Raynaud's disease for the past fifteen years. The condition first appeared during the winter following the birth of her first child, and has recurred each winter since then. On cold days the fingers of both hands become cold, painful, and blanched, especially at the tips. After several hours the pain diminishes, the fingers feel hot, the colour changes to pink, and later it returns to normal. Three and a half years ago the finger tips became the seat of painful ulcers, which remained throughout the winter and healed with the advent of warm weather, only to recur each succeeding winter. At times some creamy material had been discharged from the ulcerated areas. She had received local treatment with ultra-violet light and infra-red rays, a bilateral cervical sympathectomy (fourteen years ago), a course of intramuscular injections of undisclosed nature (six years ago), and calcium lactate by mouth. None of these measures produced any improvement in her condition.

Three years ago the patient first noticed a painless lump, about the size of a florin, on the right knee. It gradually enlarged, and twelve months ago she reported to the skin out-patient department at Sydney Hospital, where she came under my care. Examination showed, on the extensor surface of the right knee, a rounded plaque about two inches in diameter and raised about a quarter of an inch from the normal skin surface. The colour of the overlying skin was yellowish in the centre and pinkish at the periphery. The plaque was firmly attached to the skin and freely movable over the deeper tissues. On the tips of the fingers were small superficial ulcers around which the skin was atrophic. The distal portions of the digits appeared shortened. A small, hard, pea-sized nodule was palpated beneath the skin on the medial side of the right forearm. General examination failed to reveal any other abnormalities.

Diagnosis of *calcinosis cutis* was confirmed radiographically. X-ray films showed calcinosis in the prepatellar region of the right knee (Figure I) and absorption of the terminal phalanges of the second, third and fourth fingers of the right hand, and of the second, third, fourth and fifth fingers of the left hand. There were areas of calcium deposition in the soft tissues of both thumbs. No obvious change was noted in the feet.

Serum calcium and phosphorus values were within normal limits, the findings being: for calcium, 10 milligrammes per 100 millilitres of serum, and for phosphorus, 3·4 milligrammes of inorganic phosphorus per 100 millilitres of serum.

Reviews.

A YEAR BOOK OF DRUG THERAPY.

AN important addition has been made to the Practical Medicine Series of Year Books in "The 1949 Year Book of Drug Therapy".[1] It apparently supersedes the volume previously devoted to general therapeutics. A wide range of literature is covered, the British representation being generous; the journals reviewed for selection of abstracts were those received by the editor between November, 1948, and October, 1949. The editor, Harry Beckman, is a pharmacologist, and this fact is reflected in his approach to the selection of material; it is not that space is used for academic pharmacology, but a small number of pharmacological articles of clinical significance are included and the literature on therapy is handled with discrimination. No attempt is made to exhaust the current literature, the abstracts included being essentially selective in nature; in some cases a particularly informative representative paper is quoted in some detail, others on the same subject receiving only brief mention in the editor's comment. This method appears to add to the practical value of the book and helps to keep down its bulk. Sections are devoted to allergy, cardio-vascular disease, dermatology, endocrinology, gastro-enterology, hæmatology, internal medicine, neuropsychiatry, obstetrics, ophthalmology, oto-rhino-laryngology, pædiatrics, röntgenology, surgical specialties and venereal diseases. In compiling the special sections the editor appears to have had in mind the general practitioner rather than the specialist, who will find his own subject covered more thoroughly in the appropriate special Year Book; but even the specialist will find much to interest him outside his own immediate field. The largest section is that on internal medicine and includes subsections on chest diseases, deficiency diseases, *diabetes mellitus*, hyperinsulinism, infectious diseases (bacterial, helminthic, protozoal, rickettsial and viral), insomnia, liver and gall-bladder disturbances, malnutrition, neoplastic diseases, nephritis, obesity, pain, rheumatic disorders, stupor and coma, and thyreoid disturbances; the subsection on infectious diseases (bacterial) deals almost exclusively with the antibiotics and sulphonamides. Much of the section on surgical specialties is taken up with the management of infections, especially by antibiotic therapy; other subjects of surgical interest are included. Altogether a great deal of ground is covered in this newcomer to the Year Book series. It should receive an interested welcome from all sections of the medical profession.

A YEAR BOOK OF PHYSICAL MEDICINE AND REHABILITATION.

AFTER a gap of two years, "The 1949 Year Book of Physical Medicine and Rehabilitation"[2] succeeds "The Year Book of Physical Medicine", which appeared for ten years up to 1947 under the editorship of Richard Kovács. The new volume, however, also includes sections on occupational therapy and rehabilitation. The senior editors, Frank H. Krusen and Howard A. Rusk, state in their preface that they believe that it presents "a comprehensive and properly balanced coverage of the 1949 literature dealing with these three fields". The journals reviewed were those received by the editors between November, 1948, and December, 1949. The material selected covers a very wide range of ideas, the inclusion of which in a single volume is well in line with the "whole man" concept of modern medical management.

[1] "The 1949 Year Book of Drug Therapy (November, 1948-October, 1949)", edited by Harry Beckman, M.D.; 1950. Chicago: The Year Book Publishers, Incorporated. 7" × 5", pp. 718, with 133 illustrations. Price: $4.75.

[2] "The 1949 Year Book of Physical Medicine and Rehabilitation" (Including a Section on Occupational Therapy) (November, 1948-December, 1949), edited by Frank H. Krusen, M.D., and Howard A. Rusk, M.D.; associate editors, Earl C. Elkins, M.D., Winifred Overholser, M.D., and George G. Deaver, M.D.; 1950. Chicago: The Year Book Publishers, Incorporated. 7" × 4½", pp. 456, with 132 illustrations. Price: $5.00.

Part I, which occupies more than half the volume, deals with physical medicine. After a short opening section on general considerations, an important section is devoted to physiological considerations. Next is collected a group of articles on devices (mostly new) and mechanical procedures, followed by sections on exercise and massage, heat and cold therapy, ultra-violet irradiation, hydrotherapy and spa therapy and medical electricity. A section of unusual interest is on ultrasonics in medicine, almost all of the material coming from Continental journals. Further sections deal with poliomyelitis, neurology and psychiatry, geriatric conditions, general medical and general surgical conditions, peripheral vascular diseases, orthopædic conditions and diseases of the eye.

The approach to Part II, which is concerned with occupational therapy, is basically psychiatric. The abstracts presented, as is pointed out in the introduction, illustrate vividly the strides which occupational therapy has made in the past decade. Two short opening sections deal with general and psychological aspects, and then its application is considered to neurology and psychiatry, pædiatrics, geriatrics, industrial medicine and certain specific conditions—quadriplegia, poliomyelitis, articular rheumatism, and tuberculosis. This part of the volume is short but stimulating.

Part III deals with rehabilitation, its modern development and the methods used. A thoughtful introduction, in which the broad aspects of the question are considered, is followed by sections on general aspects, facilities for rehabilitation, and its application to neurology and psychiatry, geriatric conditions, industrial medicine, and specific conditions, including paraplegia, hemiplegia, cerebral palsy, war injuries, loss of limb amongst children, arthritis, tuberculosis, deafness and speech defects. The material in this part, like much of that throughout the volume, is thought-provoking and worthy of careful study. It needs to be emphasized that this Year Book, which from its title might be dismissed as likely to interest only the orthopædic surgeon and those who practise physical therapy in its conventional sense, contains much to interest any medical practitioner who treats his patients as persons.

TEXT-BOOK OF HISTOLOGY.

THE teaching of histology has improved greatly during recent years. Two main factors have contributed to this improvement. One is the increased use of visual aids such as photomicrography, time-lapse motion picture photographs, dark field and phase micrography and cinematograph films of living cells and tissues. The other, perhaps even more important, factor is a more philosophical approach to this and other descriptive subjects: an attempt to illuminate the facts from within and to regard the material studied as dynamic and living rather than static and fixed. "Text-book of Histology", by José F. Nonidez and William F. Windle, is an excellent example of the modern approach to histology.[1] The senior author, the late Professor Nonidez, had been preparing a text-book of histology when he died in 1947. In the draft of a preface he had written: "The purpose of the proposed book is to present in concise form the fundamental facts on the finer structure of the mammalian body, including man, and to emphasize as far as possible the functional aspects. . . ." The book was completed and partly rewritten by William F. Windle. It is a text-book for beginners, and while it should meet the needs of medical and dental students, it is also suitable for students of other faculties, and for advanced high school pupils. It is written clearly and, within its range, is most thorough and complete. A complete bibliography is purposely omitted, but at the end of each chapter there is a short list of references to standard text-books, monographs and articles in scientific journals. A novel feature is a brief comment on each reference which reads like a polite and friendly social introduction. The direct, simple style of this book, the abundant and excellent illustrations, introduce the student gently but expertly to the formal and intricate garden of elementary histology, while the references, personally introduced, show him the vistas that lie beyond. The 287 illustrations comprise 209 drawings and diagrams and 193 photomicrographs. No colour is used, but the quality of the photomicrographs is so good that the use of colour could hardly improve them. At the end of the book a reference list of motion-picture films of histological material is given, together with the sources from which they were obtained. The book has been very well edited and the paper, type, reproduction of photographs, and binding are superlatively good. It is not, of course, suitable for advanced students, but one could hardly imagine a better text-book of histology for the beginner. It can be recommended, too, as a delightful surprise to anyone who was taught histology the hard way, years ago, and wishes to revise his knowledge of the subject.

[1] "Textbook of Histology", by José F. Nonidez, D.Sc., and William F. Windle, Ph.D., Sc.D.; 1949. New York, Toronto and London: McGraw-Hill Book Company, Incorporated. 9″ × 6″, pp. 470, with 287 illustrations. Price: $6.75.

THE STORY OF A RESTLESS DOCTOR.

"A DOCTOR REGRETS . . ." is the autobiography of Donald McI. Johnson to his thirty-third year, the age at which he gave up medical practice.[1] The story of the interval between then and the time of writing, during which the author established himself as a publisher, is to be told in another volume.

From infancy Johnson seems to have rebelled against the direction of his life by traditions and elders. At home in the professional middle-class atmosphere of a dull Lancashire town, at school (especially at a public school of the older tradition), at Cambridge, in hospital and in general practice, a constantly restless attitude is evident, an individualism which is sometimes a weakness, sometimes a strength. There were interludes of greater interest—an expedition to East Greenland and a term in Labrador with the Grenfell Mission, both involving medical duties—but at no time did Johnson accept his family's tradition of medical practice, much less his father's often expressed wish that he should "settle down". Eventually he gave up practice in revolt against dull routine and against bureaucratic intrusion on his personal freedom—and this was long before the present National Health Service.

Some will find this book irritating, some will find it dull, and perhaps it is both in places. Nevertheless, its spirit of discontent is a good antidote for smugness, and there is much to enjoy in what Johnson has to tell. Splendid photographs taken in Greenland and Labrador are highlights of a volume which is in general well produced. However, the need for an "errata" slip is surely embarrassing in an author-publisher's own book, and it does not exhaust the possible corrections. For example, the phrase "for Sheila and I" on pages 85 and 86 could be improved. Clarity would be gained if the following sentence on page 95 was recast: "I was the only one who, when we listened to the wireless, was more interested in the settlement of the coal strike, than I was in the results of the Henley Races!" Good taste suggests the elimination of the irreverent flippancy in the sixth and seventh lines from the bottom of page 119. The use of correct punctuation in relation to quotations would effect an improvement. We might also question the originality of extolling local therapy with saturated magnesium sulphate solutions in 1949. However, these are minor faults in a pleasant enough book, which most doctors will enjoy.

A NEW MEDICAL DICTIONARY.

FOR many years "Gould's Medical Dictionary" has been widely known as a standard publication of its type, but it has now been superseded by "Blakiston's New Gould Medical Dictionary", which is claimed to be a completely new reference work.[1] The editors, appreciative of the traps which await, and often ensnare, the revisers of old-established books, decided to start afresh. They used the last edition of "Gould's Medical Dictionary" (the fifth, published in 1941) as a framework, but explored a wide field of medical literature to obtain their information. This was made practicable only by the fact that they had to assist them a staff of 80 contributors, each distinguished in his own field; but the editorial task itself must still have demanded much patience, judgement and hard work before the task was completed. The result appears to be very satisfactory. A great deal of information, carefully selected and checked, has been included in a reasonably sized volume, the printing and general lay-out of which contribute measurably to its value as a work of reference. Many items of present interest have been included, and

[1] "A Doctor Regrets", by Donald McL. Johnson; 1949. London: Christopher Johnson. 8½″ × 5½″, pp. 248, with many illustrations. Price: 12s. 6d.

[2] "Blakiston's New Gould Medical Dictionary"; editors, Harold Wellington Jones, M.D., Norman L. Hoerr, M.D., Arthur Osol, Ph.D.; 1949. Philadelphia and Toronto: The Blakiston Company. Sydney: Angus and Robertson. 9″ × 7″, pp. 1332, with 252 illustrations. Price: 84s.

out-of-date material has been deleted, though not without careful thought. Reference is facilitated by the generous use of well-indexed tables and lists. Illustrations are absent from the text, but 45 well-produced plates (many in colour) illustrate a number of subjects, notably anatomy, and should be found particularly helpful by non-medical people referring to the dictionary. Special attention is paid to the pronunciation and derivation of words; Roman characters have been used in the printing of Greek roots. Preliminary perusal does not allow of adequate checking, though one small error was detected—the initial of the Australian physician Swift is H, not W., as on page 1011. This is, of course, the type of minor slip which even the most exacting editors find hard to avoid. The volume is to be commended and should find an apreciative public especially amongst those who knew its predecessors.

A DEBATE ON EVOLUTION.

IN "Is Evolution a Myth?", Mr. Douglas Dewar, Lieutenant-Colonel L. Merson Davies and Professor J. B. S. Haldane engage in a written debate on the subject. "The weight of evidence is heavily against the theory of organic evolution", organic evolution being defined as "the theory that existing animals and plants, and also mankind, are descended from simple forms of life".[1] The result is not particularly satisfactory. As in most similar debates, neither side is able, in the limited number of words mutually agreed upon, to develop its own arguments fully or to answer its opponent's points; this may, of course, be an advantage or a disadvantage, according to the weakness or strength of the respective positions, and the reader is left guessing. The participants in the debate are palpably sincere, but they are equally palpably convinced of the rightness of their own points of view and make the most of debating advantages. Those interested should read the arguments adduced for themselves. The one point that clearly emerges is that there are two sides to the question.

HISTOLOGY OF THE BODY TISSUES.

A LITTLE BOOK with the curiously worded title "A Histology of the Body Tissues" has been written by Margaret Gillison, who holds a Diploma in Physical Education of the University of London and is Lecturer in Physiology at the I. M. Marsh College of Physical Education, Liverpool.[2] In a foreword, R. C. Garry, Regius Professor of Physiology in the University of Glasgow, explains that the intention of the book is to meet the needs of students of physiotherapy and physical education, and observes that the integration of microscopic structure and physiological activity is so happy that the book could equally well serve all students as an introduction to animal biology. As its title implies, the scope of the book is limited to the study of body tissues; the structure of organs is not described. An introductory chapter and a note about the preparation of sections for microscopic examination are followed by descriptions of the surface and lining tissues, cartilage and bone, blood and tissue fluids, muscle, and the nervous tissues. The illustrations, however, include microscopic sections of organs which demonstrate the integration of the various tissues in their structure. The book includes 103 illustrations in black and white and these deserve a special word of praise. Apart from some line diagrams, all were made directly from micro-preparations, and the drawing is both skilful and accurate, so that the characteristics of the particular tissue are emphasized without distortion. As Professor Garry remarks in his foreword, photomicrographs are in theory to be preferred, but in an elementary book there is much to be said for drawings of "ideal" sections. In places the text betrays the fact that the author has not had a thorough grounding in the basic sciences. For instance, she writes (page 114) that in preparing a blood film the plasma is "evaporated" until only the blood corpuscles remain; and again (on page 104) the serum "evaporates" leaving only the now solid clot. On the whole, however, the book is clearly and faithfully written, and should prove most useful to students of physiotherapy and of physical education.

[1] "Is Evolution a Myth?", a debate between Douglas Dewar, B.A., F.Z.S., L. Merson Davies, D.Sc., Ph.D., F.R.S.E., F.G.S., and Professor J. B. S. Haldane, F.R.S.; 1949. London: C. A. Watts and Company, Limited. The Paternoster Press. 7¼" × 4¾", pp. 92. Price: 2s. 6d.

[2] "A Histology of the Body Tissues: With a Consideration of Their Functions", by Margaret Gillison, with a foreword by R. C. Garry, D.Sc., M.B., Ch.B., F.R.S.E.; 1950. Edinburgh: E. and S. Livingstone, Limited. 7¼" × 5¼", pp. 240, with 103 illustrations. Price: 15s.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Recent Advances in Chemotherapy", by G. M. Findlay, C.B.E., Sc.D., M.D., F.R.C.P.; Third Edition; 1950. London: J. and A. Churchill, Limited. 8" × 3½", pp. 636. Price: 36s.

The first of four volumes which will make up the third edition.

"The 1949 Year Book of Pathology and Clinical Pathology (January-December, 1949)"; Pathology, edited by Howard T. Karsner, M.D., LL.D.; Clinical Pathology, edited by Arthur Hawley Sanford, M.D.; 1950. Chicago: The Year Book Publishers, Incorporated. 7" × 4¾", pp. 544, with 161 illustrations. Price: $4.75.

One of the "Practical Medicine Series" of Year Books.

"You and Your Heart: A Clinic for Laymen on the Heart and Circulation", by H. M. Marvin, M.D., T. Duckett Jones, M.D., Irving H. Page, M.D., Irving S. Wright, M.D., and David D. Rutstein, M.D., with a foreword by Paul D. White, M.D.; 1950. New York: Random House. 8½" × 5½", pp. 320, with a few illustrations. Price: $3.00.

The book is stated to be a contribution to freedom from fear.

"Clinical Nutrition", edited by Norman Jolliffe, M.D., F. F. Tisdall, M.D., and Paul R. Cannon, M.D.; 1950. New York and London: Paul B. Hoeber, Incorporated. 9¼" × 6", pp. 940, with 127 illustrations, some of them coloured. Price: $12.00.

"An effort has been made to include that which is clinically significant . . . and to omit that which is of purely academic interest." By thirty-six contributors.

"The 1949 Year Book of Physical Medicine and Rehabilitation" (Including a Section on Occupational Therapy) (November, 1948-December, 1949), edited by Frank H. Krusen, M.D., and Howard A. Rusk, M.D.; associate editors, Earl C. Elkins, M.D., Winifred Overholser, M.D., and George G. Deaver, M.D.; 1950. Chicago: The Year Book Publishers, Incorporated. 7" × 4¾", pp. 456, with 132 illustrations. Price: $5.00.

One of the "Practical Medicine Series" of Year Books.

"Common Diseases of the Ear, Nose and Throat", by Philip Reading, M.S. (London), F.R.C.S. (England); 1950. London: J. and A. Churchill, Limited. 8" × 5½", pp. 298, with 37 illustrations. Price: 21s.

Intended for the student and the newly qualified medical practitioner.

"The Health of the People", by S. Lee, M.D., D.P.H.; 1950. London: Victor Gollancz, Limited. 7¾" × 5", pp. 288. Price: 12s. 6d.

An historical survey of health conditions in England from the sixteenth century to the present time. Reference is also made to present-day industrial medical services and the national health service.

"The 1949 Year Book of Dermatology and Syphilology (November, 1948-December, 1949)", edited by Marion B. Sulzberger, M.D., and Rudolf L. Baer, M.D.; 1950. Chicago: The Year Book Publishers. 7" × 5", pp. 514, with 76 illustrations. Price: $5.00.

One of the "Practical Medicine Series" of Year Books.

"The Wine Industry of Australia", by H. E. Laffer, R.D.A.; 1949. Adelaide: Australian Wine Board. 8½" × 5½", pp. 148, with illustrations.

An historical record of the beginning and development of the industry.

"Marriage Crisis", by David R. Mace; 1948. London: Delisle. 8½" × 5½", pp. 142. Price: 7s. 6d.

A book for "ordinary folks" written in "the way ordinary folks will understand".

The Medical Journal of Australia

SATURDAY, AUGUST 26, 1950.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: surname of author, initials of author, year, full title of article, name of journal without abbreviation, volume, number of first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

THE NUFFIELD FOUNDATION.

THE fifth report of the Nuffield Foundation for the year ended March 31, 1950, has been received. The report, which has been described in these columns from year to year as of the greatest significance, has an added interest on this occasion in view of the stimulating visit to Australia recently of Mr. Leslie Farrer-Brown, the Foundation's secretary. During his visit leaders in Australian medicine and in science generally were able to learn at first hand what the Foundation is trying to do, and the mutual exchange of views cannot have failed to deepen the understanding of all concerned. In October of last year we pointed out that the fourth report marked the end of the Foundation's first planned period. The present report deals with the first year of the second quinquennial period. Last year it was announced that the Foundation intended during the second period to seek opportunities to further the search for new knowledge, especially in the fields of biological and sociological studies, and also to support or "initiate attempts to apply existing knowledge to practical problems of contemporary importance". It is pointed out that the deliberate division of interest between the acquisition of new and the application of existing knowledge, between "pure" and practical research, is seldom in reality as neat as it appears on paper. All knowledge is potentially useful, and it is often impossible to draw a line across a field of research and to say what is fundamental work and what is not. "The decision that a discovery is fundamental is as a rule a retrospective judgement." Facts such as these need emphasis today, especially when money is sought for research from governments or individuals. Lay philanthropists sometimes find it difficult to understand that pure research and practical research cannot be sharply differentiated, that results of the greatest practical value may arise from a single isolated scientific observation and that for this reason isolated research of what may be called the roving type should not be discouraged. As a matter of fact it has recently happened that the administration of research funds has been hampered by rigid conditions imposed by a benefactor. But this is perhaps a digression, though it is justified by the statement in the report that, because of the difficulty in defining fundamental research in advance, the support of research is risky—"the gamble is not so much on the results as on their significance".

During the year under review grants promised by the Foundation amounted to £506,925. To meet them a total of £377,425 was allotted from the year's income; in addition, previously promised grants to a total of £135,000 had to be met, making a total of £512,425 for the year. The Foundation is not averse to taking what it defines as risks; it has devoted, for fundamental research, £46,750 to biological and £33,000 to sociological studies, and £25,000 has been promised for the first grant for research overseas within the Commonwealth. Readers should perhaps be reminded that two of the three objectives of the Foundation are the advancement of health and the advancement of social well-being. The work receiving support from the Foundation is best considered under two headings—the continuation of the past programme and work under the new programme. Under the former are mentioned five projects in the medical sciences, three in the natural sciences and one in the social sciences. The five medical projects are of special interest. They include radiological research at Oxford into normal health, a study of health in the linen industry in Northern Ireland, a second follow-up of children born in 1946,[1] a study of child development at the Institutes of Child Health and of Education at the University of London, and a nutritional survey of old people living alone at Sheffield. In addition, research is being continued into rheumatism by means of the Oliver Bird Fund, an auxiliary fund of the Foundation, of £450,000, administered by the Managing Trustees of the Foundation. Work is being carried out on cortisone and ACTH — alternative ways of making cortisone are being investigated, as is also the problem of what happens when cortisone and ACTH are given to rheumatic subjects. The new programme has to do with fundamental research chiefly, but not exclusively, in biology and sociological studies. In biological studies the Foundation's main aim is to give support to work in the normal mechanisms of growth, differentiation and self-maintenance of living organisms. For example, experiments are being carried out with techniques for transplanting the nucleus from one type of cell into another type of cell. It is the nature of the interaction of the nucleus and the cytoplasm that is being investigated. "The study of the chemical morphology of the cells will be attempted by new cyto-chemical methods of 'labelling' proteins in the cytoplasm by building into them substances that can be identified and followed by their light-absorbing or electron-scattering properties—rather as radioactive isotopes are used to trace and localize substances." On the sociological side research will be carried out at Aberdeen into

[1] The first investigation was made by a joint committee of the Royal College of Obstetricians and Gynæcologists, the Population Committee and the Institute of Child Health of the University of London. The results were published in a book entitled "Maternity in Great Britain" (see THE MEDICAL JOURNAL OF AUSTRALIA, May 7, 1949, page 621).

the budgets of young childless couples, married couples having their first child and married couples having their second baby. Techniques of social research will be studied and developed.

Up to the present the Foundation has limited its grant-giving overseas to training fellowships and scholarships, but the Foundation has begun "to seek opportunities of supporting . . . new projects of research in Dominion universities". It has agreed to provide over ten years a sum of £25,000 to endow a research chair in mechanical engineering in the new University of Technology that is being established in New South Wales. This extension of the activities of the Foundation is of the utmost importance to the British Commonwealth. The increasing range is shown in several other ways. Readers of this journal are well acquainted with the fellowships, scholarships and other awards made to carefully-chosen graduates of Dominion universities to enable them to go to England for special study. The hope has been expressed in this journal that "a two-way traffic" would be seen before long. The present report tells us that three travelling scholarships, to be held for periods up to a year, have been awarded to members of the British Civil Service. One officer is to study administrative organization of health services in Australia and New Zealand; another is to study grain storage in Australia and New Zealand, and a third the development of capital investment in India. A third activity must be mentioned; it comes under the heading of "Miscellaneous Projects", and has to do with the Association of British Universities. Last year the Association arranged the first of a series of annual meetings (in between the regular quinquennial congresses of Commonwealth universities) for the discussion of common problems. The meeting coincided with the annual National Conference of Canadian Universities. The Foundation made a grant to help with the travelling expenses of the gathering. The success of the meeting was so great that the Foundation has made a further grant of £16,000 to support four more annual meetings to be held in different Dominions in turn. There also exists a Canadian British Education Committee, the aim of which is to encourage boys and girls from schools in Britain to take their university courses in Canada with a view either to their settling in Canada or to their returning to Britain "with something of the refreshing outlook of a new country". The Foundation has made a contribution towards the expenses of the committee.

This report of the Nuffield Foundation is clearly a more heartening and stimulating document than usual.[1] Reaching Australia so soon after the British Commonwealth Medical Conference, held recently in Brisbane, it is bound to give satisfaction to all medical graduates and others associated with them who strive for the unity of the British Commonwealth. The report has a message for medical people who are devoted to the prevention of disease and the discovery of its cause, to those who father research or administer research funds, and to those in the widely separated parts of the British Commonwealth who rejoice at every fresh attempt to bring them into closer communion, one with another.

[1] The section of the report dealing with the care of old people (the third of the Foundation's objectives) is left for discussion at a later date.

Current Comment.

LIFE STRESSES AND CARDIO-VASCULAR DISORDERS.

IT is a truism that, despite the great advances made by the human race in meeting the assaults of the physical world, and in harnessing to his needs at least some of its beneficent and maleficent forces, man is still vulnerable to the symbolic threats of life. One of the weak points in his armour is that the inner conflict between conformity with community life and fulfilment of individual aims and ambitions is prone to produce physical trauma in his mind-body complex. Harold G. Wolff, in writing of life stress and cardio-vascular disorders,[1] points out the interesting linkage of the word "heart" with man's fears and loves; it even outnumbers all other words in the index of Roget's "Thesaurus". He quotes observations which have been made on the effect of psychic stress on exercise tolerance, and other measures of circulatory efficiency, and also on subjective sensations referable to the heart and circulation, such as dyspnœa and discomfort in the chest. This type of affection may in certain persons lead to neuro-circulatory asthenia, as is well known, particularly if a morbid introspection is permitted to assume a significant part of the field of consciousness. Wolff goes on to show how patients with structural heart disease may be adversely affected by stresses of life, and further deals with the cardiac arrhythmias in persons who are the subjects of anxiety. This is, of course, a familiar phenomenon to the clinician, but Wolff has analysed a series of 25 unselected patients with particular attention to a consideration of their life situations and emotional states. All these patients had some form of cardiac arrhythmia, such as paroxysmal tachycardia, nodal tachycardia or auricular fibrillation. A definite relation was established between the attacks and periods of emotional disturbance, even when attacks were excited by some physical upset, which was operative only when a vulnerable state existed. Similarly, electrocardiographic studies showed that precordial pain in patients with early signs of myocardial insufficiency bore a relation to suppressed emotions such as anger, anxiety or frustration. To these familiar types of circulatory disturbance connected with tensions, recognized or unrecognized, Wolff adds variability in the results obtained by the cold pressor test in subjects of hypertension, and in the renal circulation. He appropriately comments that the subject of hypertension lives perpetually prepared for action; a physiological state that should last for only brief periods becomes for him a way of life. In summing up, the author emphasizes that reactions to stresses of life may appear as circulatory phenomena associated with either hyperdynamic or hypodynamic responses.

A similar study has been carried out by C. H. Duncan, I. P. Stevenson and H. S. Ripley.[2] They have confined their analysis to patients with auricular arrhythmia of paroxysmal type. Of their 26 unselected patients, the diagnosis of nodal or auricular tachycardia was established in two-thirds by electrocardiography during an attack, and in the remainder by clinical and laboratory study. Half of the patients showed evidence of structural heart disease. Careful daily observations were made, and particular attention was paid to the life situations of the patients. The authors found that seven of eleven patients in regard to whom adequate information was obtained about the years of childhood, had unsatisfactory relations with their parents, who displayed varying degrees of hostility, dominance and over-protectiveness. In general the marital and sexual lives of all the patients were unsatisfactory. It is interesting here to remark that physicians not specially interested in the mental reactions and experiences of their patients have been known to comment upon the frequency of cardiac "episodes", even of serious kind, in middle-aged men with life stresses of this kind during this dangerous period. Duncan and his associates noted that personalities

[1] *Circulation*, February, 1950.
[2] *Psychosomatic Medicine*, January-February, 1950.

suggesting the type found in the effort syndrome were not uncommon, and that unexpressed hostility, compulsive behaviour and long-standing anxiety were outstanding features of their patients. This was made all the more evident in some by the apparent signs of somatic tension. In general there was close correspondence between the episodes of arrhythmia and periods of stress in the life of the patient. This was found not only in the subjects of paroxysmal tachycardia, but also in those who had bouts of paroxysmal auricular fibrillation. Sudden fright, evoked hostility and even terrifying dreams excited some of the attacks. It is all the more important to realize this in auricular fibrillation, for its nature is such as to suggest, though not always with good reason, a more disturbing cause. The authors have put their ætiological views to the test in some cases by inducing attacks in patients during experimental interviews. They have attempted to modify the frequency of attacks by therapy directed towards the psychological factors, and with some success. They have also tried to attack the problem from the physiological point of view, basing this on the known vagal influences, particularly in paroxysmal fibrillation, in which the pulse is often rather slow at rest, and the *P–R* intervals somewhat prolonged. On the other hand, both sympathetic and parasympathetic influences may induce paroxysms, so that no specific drug appears to be indicated. Rather general measures which might allay the sensitivity of the whole autonomic mechanism in this regard seem to be appropriate. One clear conclusion emerges from this work: that the environment of the patient's mind and body and his reactions to it are very important factors in the production of circulatory irregularities, and that effective treatment is more likely to be so based than upon any measure which attracts more attention to the action of the heart.

DEATH OF INFANTS AFTER CÆSAREAN SECTION.

THE failure of the fœtal mortality rate to drop proportionately with the maternal mortality rate with the wider and wiser use of Cæsarean section has been rather disappointing. It is true that the fœtal mortality has decreased and that more and more Cæsarean section is being performed primarily in the child's interest; an important fallacy in the comparison of the respective rates following abdominal and vaginal delivery is seen in the blunt statement of E. L. Cornell[1] that "many a child has been made an idiot by the obstetrician's stubborn determination to deliver the patient from below". It will be obvious, too, that maternal conditions indicating Cæsarean section are often harmful to the child. A vital aspect, however, is that of harm to the child as the result of the Cæsarean procedure *per se*, and on this some interesting points have been brought to light by Daniel B. Landau *et alii*.[2] They point out that some of the babies who die have initial difficulty in starting breathing, which is generally attributed to lack of conditioning of the infant by uterine contractions. But their chief interest is in the group of babies who become ill several hours after delivery, their initial condition having been good. These babies become dyspnœic and cyanosed, and have air hunger with subcostal retraction and a rapid, feeble pulse. Their condition deteriorates rapidly, and they may die in a few hours. Some workers have attributed these deaths to ingestion or inhalation of *liquor amnii*, but Landau and his associates suggest that it is due to blood loss. They point out that in a normal delivery the cord is not tied until it has ceased to pulsate, and by this time the contractions of the third stage of labour have squeezed the blood from the placenta into the infant. In a Cæsarean section it is usual to clamp and cut the cord as soon as the infant is delivered. It has been found in a series of normal deliveries that if the cord was tied as soon as the baby was delivered, the average blood volume of the infants was 301 millilitres, as against 361 millilitres if the cord was not tied until pulsation had ceased; the amount of blood that could be drained from placenta and cord tied immediately after delivery averaged 107 millilitres. It is estimated that at term from 26% to 34% of fœtal blood is in the placental and umbilical vessels. Landau *et alii* therefore have developed the technique of handing the baby delivered by Cæsarean section to a gloved and gowned assistant, who holds it head down until the placenta, still attached to the baby, is delivered. The placenta is wrapped in a sterile towel and suspended above the baby, which lies wrapped in a sterile cloth and warmed blanket on a table. When pulsation in the cord has ceased near the infant, the cord is tied and cut. On several occasions the placenta has been weighed before and after suspension, and a difference in weight of 45 grammes has been recorded. In one case the cord was accidentally cut during the incision of the uterus and was tied immediately; the detached placenta was suspended, and 95 millilitres of blood were recovered from it. Landau and his colleagues claim that since instituting the technique they have had a series of 87 Cæsarean sections without an instance of delayed shock occurring in the infant. They appear to have found and mended an important weak link in the chain of Cæsarean section technique.

[1] *The Surgical Clinics of North America*, February, 1950.

[2] *The Journal of Pediatrics*, April, 1950.

ACHLORHYDRIA IN YOUNG ADULTS.

THE ingenious piece of apparatus for obtaining gastric biopsy specimens, devised in the Clinical Research Unit of the Walter and Eliza Hall Institute of Medical Research and the Royal Melbourne Hospital, was referred to in these columns on February 12, 1949. It was agreed then that its use was more likely to be of value in the investigation of the effect on the gastric mucosa of various physiological and pathological conditions than in the diagnosis of gastric disease. The latest report of its use, in a paper by R. K. Doig, R. Motteram, S. Weiden and I. J. Wood,[1] is in accord with this. A group of 134 volunteers, all medical students, were submitted to test-meal examination, and only one example of persistent histamine-fast achlorhydria was found—a finding that confirms current opinion on the low incidence of achlorhydria in young adults. The student concerned and four others, the results of whose test-meal examinations were normal, were then submitted to gastric biopsy. The four controls were found to have relatively normal gastric mucosa. The student with achlorhydria had an unusual type of atrophy of the specific glandular elements of the gastric glands and an absence of superficial inflammation; similar atrophic changes were present in two different specimens. Doig and his colleagues think that the result suggests that achlorhydria has a definite histological abnormality as its cause in healthy people as well as in patients with dyspepsia and related conditions; they are the first to have demonstrated the probable appearance of these changes. No ætiological factors for gastritis were found in the student. He had a family history of pernicious anæmia and of hypochlorhydria on the maternal side, but his blood, gastro-intestinal tract (apart from the gastric secretion) and general clinical condition all appeared to be normal. The volume of gastric juice secreted was normal, but free acid was absent and pepsin and mucus were much reduced in amount. It is felt by Doig and his colleagues that persisting achlorhydria, when histamine is used as a stimulus, will always be associated with a diffuse histological change in the mucosa of the body of the stomach, independent of the presence or absence of any symptoms relating to the gastro-intestinal tract or elsewhere. No doubt this report, with its positive contribution to the understanding of achlorhydria, will stimulate others to check the findings and the validity of the tentative conclusions drawn.

[1] *The Lancet*, May 20, 1950.

Abstracts from Medical Literature.

MEDICINE.

After-Effects of Trench Foot and Frost Bite.

M. MENDLOWITZ AND H. A. ABEL (*American Heart Journal*, January, 1950) have measured the flow of blood in the human toe in normal subjects and in patients with residual symptoms of trench foot and frost bite. In the latter group the flow of blood was found to be significantly decreased and this was attributed to organic obstruction or constriction of the small arteries of the foot.

Amyotrophic Lateral Sclerosis.

A. P. FRIEDMAN AND D. FREEDMAN (*The Journal of Nervous and Mental Disease*, January, 1950) analyse a series of 111 cases of amyotrophic lateral sclerosis. The average duration of life of the patients was three years. The data show that the onset may occur in any portion of the spinal cord or brain stem. The series differs from usual reports in the frequent onset of initial signs in the leg (38% of cases). In 98% of cases evidence was found of anterior horn changes; in 25% no clinical evidence was found of pyramidal disease. Involvement of the cortex was found in only 12 out of 37 cases. In 50% of cases the patient at one time or another suffered from sensory disturbances. Deep heavy achings often preceded the muscular palsy. Sphincter disturbances were unusually high; 15% of patients had difficulties in urination. Eleven autopsies revealed no specific pathological changes. The authors were not impressed with the use of vitamin *E* in treatment; the patients continued to die, and of 17 patients who had intensive treatment, only one was thought to have shown possible improvement. The authors decline to give an opinion on the use of cytochrome *C*.

Factors in Congenital Heart Disease.

M. CAMPBELL (*The Quarterly Journal of Medicine*, October, 1949) reviews the question of genetic and environmental factors in congenital heart disease, in the light of 300 cases of congenital heart disease in children. He concludes that the causes of this condition are mainly genetic, though maternal rubella early in pregnancy is occasionally responsible. He considers it right, clinically, to tell the mother of a child with congenital heart disease that there is no risk of other children being born with such a condition; this is not scientifically true, but the risk that the next two or even three children will show any serious congenital defect is small.

Pregnancy and Pulmonary Tuberculosis.

H. M. TURNER (*The Lancet*, April 15, 1950) has studied 718 pregnancies in 584 women with tuberculosis. He states that survival rates for the groups with active pulmonary tuberculosis do not suggest that the effect of pregnancy on the group as a whole is adverse. Unfavourable influence in some cases is more than counterbalanced by favourable influence in others. Pregnancy probably adds little to the risk of reactivation of quiescent pulmonary tuberculosis. The possible times of unfavourable influence are the first four months and just after parturition. The prognosis in active pulmonary tuberculosis when spontaneous abortion occurs seems to be better than when pregnancy goes on to full term. The author suggests that the influence of chorionic gonadotropin is potentially adverse and that of œstrogen potentially favourable; on this basis little advantage would accrue from termination of pregnancy after the first trimester, and administration of gonadotropic substance to counter possible early abortion would favour reactivation.

Sympathectomy in Hypertension.

R. PLATT AND S. W. STANBURY (*The Lancet*, April 8, 1950) present the results of sympathectomy in 80 cases of hypertension. They attribute many of the good results recorded by others to inadequate appreciation of the benign and variable course of mild hypertension. In their series only patients whose prognosis was judged to be unfavourable—usually with resting diastolic blood pressures of 120 millimetres of mercury or more—were subjected to operation. In only 11 of the 80 cases was a significant and lasting reduction of blood pressure achieved—most of the patients concerned being young women, under forty years of age, with either essential hypertension or renal hypertension with good renal function. The authors state that headache and retinopathy are sometimes relieved by a sympathectomy which has failed to reduce blood pressure. They consider that sympathectomy should very rarely be advised in hypertensive disease and define some of the indications.

Thrombocytopenic Purpura following Rubella.

J. F. ACKROYD (*The Quarterly Journal of Medicine*, October, 1949) reports three cases of thrombocytopenic purpura occurring after rubella. He reviews the question of purpura associated with infections and concludes that the degrees of thrombocytopenia and increased capillary fragility in acute infections depend upon the susceptibility of the patient's tissues rather than upon the intensity of the primary infection, and that purpura occurring during the early stages of an infection may be due to a high degree of susceptibility to capillary damage and sometimes also to thrombocytopenia.

Gastro-Duodenal Hæmorrhage.

C. E. WELCH (*The Journal of the American Medical Association*, December 17, 1949) points out that the mortality from massive hæmorrhage due to gastric or duodenal ulcer is still high; in the Massachusetts General Hospital it was 14% from 1937 to 1941, 11% from 1942 to 1947 and 10% in 1948. He considers that variations in mortality reported from various hospitals are due more to the type of patients admitted and the method of statistical analysis than to any particular superiority of therapy. In the author's view the high mortality can be reduced by recognition of the small group of patients over fifty years of age whose bleeding will not stop without surgical intervention, and by immediate operation on all other patients who have recurrent bleeding while under observation. Other patients, who have no recurrence of bleeding, usually should undergo interval resection. Reduction in surgical mortality will depend on absolute hæmostasis, on careful attention to the duodenal stump and on recognition of the depleted state of this group of patients.

Melæna.

H. L. THOMPSON AND D. W. MCGUFFIN (*The Journal of the American Medical Association*, December 24, 1949) discuss the causes of melæna, a condition of black stools which can be caused by the placing of 50 millilitres of blood in the stomach. Bismuth, iron, charcoal and certain foods may give rise to difficulty in diagnosis. Of 293 cases studied, melæna was due in 30% to peptic ulcer, in 20% to dysentery (bacillary), in 9% to œsophageal varices, and in 7% to 8% to carcinoma of the stomach and colon, ulcerative colitis and diverticulitis. The diagnosis was made clinically and radiologically; the clinical diagnosis was confirmed *post mortem* in a high proportion of cases when the patients died, and was frequently justified during life when radiological or bacteriological diagnosis was delayed or uncertain. The gastroscope and the sigmoidoscope were of value in some cases, but in general most reliance was placed on clinical and radiological investigations.

Occult Blood.

S. O. HOERR, W. R. BLISS AND J. KAUFFMAN (*The Journal of the American Medical Association*, December 24, 1949) discuss the clinical evaluation of occult blood in the fæces. Benzidine, orthotolidine and guaiac tests were used. Ferrous sulphate was shown to give a weakly positive response with the guaiac test when taken by mouth. Of 264 stools from unselected patients a positive response was given by 95% to the benzidine test, by 87% to the orthotolidine test, and by 22% to the guaiac test. The authors state that occult blood may come from the nose or gums, or may result from hæmoptysis, leuchæmia, nephritis, peptic ulcer, œsophageal varices, hæmorrhoids, carcinoma or colitis. The benzidine and orthotolidine tests were not so reliable as the guaiac test; they were too sensitive and depended too much on a special diet prior to the test. The guaiac test was the most reliable and the simplest.

Duration of the Infection in Scarlet Fever.

PAUL S. RHOADS, GUY P. YOUMANS AND RENO ROSI (*Annals of Internal Medicine*, January, 1950) present a study on the duration of the infection in scarlet fever, based upon a clinical follow-up of 163 patients after discharge from hospital. It is shown that most patients with scarlet fever are still carriers of

hæmolytic streptococci when quarantine is terminated, and for several weeks thereafter. These patients frequently transmit the disease to other susceptible persons. Most patients with scarlet fever have not completely recovered from the infection at the time when the present quarantine is lifted, and many complications occur after this time. It may be more logical to terminate quarantine of scarlet fever patients on the basis of failure to yield cultures of hæmolytic streptococci. As many complications of scarlet fever, including rheumatic fever, occur many weeks after the onset, patients with this disease must be kept at rest and under strict surveillance until they fail to yield hæmolytic streptococci on attempted culture and their blood sedimentation rates are normal. In the authors' series, only penicillin given intramuscularly in doses of 160,000 units per day or more, and continued for an average of six days, appeared to have any beneficial effect in changing the course of the disease and terminating the carrier state. Antitoxin was not used, and no comparison with convalescent serum is made, as it was not used in adequate doses.

Atelectasis.

W. ROSS WRIGHT (*The Canadian Medical Association Journal*, March, 1950) discusses atelectasis, and states that it is a fairly common condition which should be borne in mind in all cases after operation, regardless of the type of anæsthetic used. When any morbid condition exists, an X-ray film of the chest should be obtained. A prophylactic regimen should be instituted in all cases, and this means paying strict attention to details in the pre-operative, operative and post-operative care of the respiratory tract. The discovery of atelectasis calls for an immediate attempt to establish a true diagnosis, and for immediate remedial measures. The bronchoscopist should be consulted early, and after simpler measures to expand the lung have failed, bronchoscopy should be performed. Atelectasis of the newborn often persists for several days and is symptomless. However, when abnormal breathing and cyanosis occur, the author considers that, until it is possible to differentiate clinically between those cases due to simple obstruction of the bronchial tree and those due to other causes, such as brain hæmorrhage, all these patients should undergo bronchoscopy. Early diagnosis and adequate treatment of atelectasis will prevent many cases of bronchiectasis and lung abscess, and may help in the future to bring many patients with bronchogenic carcinoma to surgical treatment while the condition is still operable.

Salt and Protein Restriction.

H. CHASIS, W. GOLDRING *et alii* (*The Journal of the American Medical Association*, March 11, 1950) discuss the effects of salt and protein restriction on blood pressure and renal disease. Twelve patients with essential hypertension were selected for study. Blood pressure determinations and renal function tests were carried out while the patients were taking a normal diet of 2500 Calories a day with six to seven grammes of sodium chloride. The patients were then given Kempner's rice diet for fourteen to ninety-eight days. In five cases 30 grammes of sodium chloride were given per day in the later stages of the experiment. In nine out of ten patients on the rice diet glomerular filtration decreased considerably, as measured by the inulin and mannitol clearance tests, and renal blood flow and maximal tubular excretory capacity also decreased. Alterations in the blood pressure of patients receiving the rice diet did not exceed the random spontaneous variations to be expected in patients in hospital without restriction of diet. When 30 grammes of salt were given per day the filtration rate increased.

Cerebral Hæmorrhage after Heparin.

SIDNEY M. COHEN (*The Journal of the Mount Sinai Hospital*, November-December, 1949) discusses massive cerebral hæmorrhage following heparin therapy in subacute bacterial endocarditis, and presents a report of two cases, with a review of the literature. The history of the development of heparin, its relation to mast cells, chemistry, mechanism of action, physiology and clinical application are summarized. It is suggested that a previously formed area of encephalomalacia, produced by embolus from a vegetation on a diseased heart valve, serves as an area of lowered resistance to the rupture of a cerebral vessel. The decreased coagulability of the blood due to heparinization permits uncontrolled extravasation of blood through a ruptured vessel into the surrounding area of tissue softening, leading to massive cerebral hæmorrhage and death. A similar mechanism is suggested in cases of so-called spontaneous cerebral hæmorrhage.

The Psychogenic Factor in Asthma.

H. K. DETWEILER (*The Canadian Medical Association Journal*, February, 1950) calls attention to the psychogenic factor in asthma, and makes a plea that special attention to the psychological background and the influence of emotional states should be given in all cases of this disease. He does not attempt to detract from the importance of studying the asthmatic patient from the conventional standpoint of allergy, both atopic and bacterial. Emphasis is placed upon the prime importance of a searching history from both the allergic and psychosomatic standpoints. Treatment based on a complete investigation in each individual case will of necessity include psychotherapy in its broad aspects, and will result in maximum benefit to the patient.

Renal Hæmodynamics in Heart Disease.

B. I. HELLER AND W. E. JACOBSON (*American Heart Journal*, February, 1950) have studied the renal hæmodynamics in 26 patients with organic heart disease by determining the effective renal plasma flow, the rate of glomerular filtration and the maximal tubular excretory capacity. They have found that the effective renal plasma flow is decreased in patients with rheumatic valvular heart disease even before the classical signs of failure have occurred; during congestive heart failure there is a pronounced reduction of the flow, while with clinical compensation the flow increases, but the mean value remains subnormal. In patients with rheumatic valvular heart disease who have never experienced congestive failure the rate of glomerular filtration remains normal. In patients studied during congestive heart failure there is a significant reduction in the glomerular filtration rate and this does not change significantly with clinical compensation. The changes in the effective renal plasma flow are disproportionately greater than those noted in the glomerular filtration rate, thus resulting in an increased filtration fraction in all phases of heart disease. The increase in the filtration fraction is greatest in patients with congestive heart failure, indicating a high degree of efferent arteriolar spasm. The tubular excretory capacity is much reduced in patients with clinical decompensation, but is normal in other phases of heart disease; the probable cause of this is renal ischæmia.

Cardiac Lesions in Arthritis.

E. F. ROSENBERG, L. F. BISHOP, H. J. WEINTRAUB AND P. S. HENCH (*Archives of Internal Medicine*, May, 1950) report that post-mortem studies have revealed that the incidence of rheumatic heart disease among patients who died with rheumatoid arthritis is far higher than in the general population. This is out of line with their clinical experience and with that of many other clinicians. Detailed examination was made of 114 patients with rheumatoid arthritis of peripheral joints and 33 with rheumatoid spondylitis to determine the incidence of major and minor cardiac abnormalities; similar studies were made of 100 non-arthritic subjects. The incidence of rheumatic heart disease judged on clinical evidence in the arthritic groups was not significantly higher than that among the controls. No explanation for the apparent difference in the incidence of the complication in the living and dead subjects has resulted from the study.

Tuberculous Meningitis in Children.

E. M. LINCOLN AND T. W. KIRMSE ((*The American Journal of the Medical Sciences*, April, 1950) state that the early diagnosis of tuberculous meningitis is most likely to be made in children already known to be tuberculous, as the most common early complaints may be general symptoms; in children not known to be tuberculous the routine use of a tuberculin skin test in persistent fever or unexplained illness should result in earlier diagnosis of tuberculous meningitis. In the evaluation of the results of chemotherapy, serous tuberculous meningitis should not be mistakenly treated as caseous tuberculous meningitis, since the prognosis is not so serious. The goal of treatment of tuberculous meningitis should be complete restitution to normal; important factors in attaining it are early diagnosis and prompt and adequate therapy. The authors report 18 cases of meningitis in which the patients have completed treatment with streptomycin and are continuing treatment with "Promizole" given orally; 13 are still alive and mentally normal nine to twenty-seven months after the initial diagnosis; four have neurological sequelæ, none seriously crippling. The addition of adequate amounts of "Promizole" to streptomycin is thought to be of advantage in these cases.

Medical Societies.

AUSTRALIAN ORTHOPÆDIC ASSOCIATION.

A MEETING of the Australian Orthopædic Association was held from June 1 to 4, 1949, at the Robert H. Todd Assembly Hall, British Medical Association House, 135 Macquarie Street, Sydney.

Tendon Transplantation after Paralysis.

DR. HAROLD CRAWFORD read a paper entitled "The Role of Tendon Transplantation in the Restoration of Function following Paralysis" (see page 313).

DR. LENNOX TEECE (Sydney) said that he felt that the paper gave too optimistic a view of the role that tendon transplantation should play in reparative surgery for paralysis. In his experience, stabilizing operations were of great value in the lower limb and balancing procedures of lesser importance. In his hands trapezius transplants for deltoid paralysis had been disappointing. In considering any tendon transplantation he stressed the basic principles that the muscle moved must have a direct pull, must have sufficient strength for its tasks and must be capable of reeducation.

DR. L. J. WOODLAND (Sydney) gave instances of transplantations which he thought were useful, for example, peroneus to *tendo Achillis, extensor proprius hallucis* to first metatarsal, and hamstrings to patella.

DR. A. R. HAMILTON (Sydney) said that he had examined a number of patients whose hamstrings had been transplanted to the patella for quadriceps weakness. In his opinion, none of the patients had obtained improvement in function. He referred to the use of the *pectoralis major* for paralysis of the biceps.

DR. B. T. KEON-COHEN (Melbourne) deprecated the fact that text-books gave so much prominence to tendon transplantation without due regard to anatomical and physiological principles. He particularly wanted to stress the necessity for correction of deformity as an essential preliminary to any tendon transplant.

DR. JOHN LAHZ (Brisbane) said that he had examined two of Dr. Crawford's patients whose trapezius had been transplanted for deltoid paralysis and had been impressed by the satisfactory function which they had. He felt that in coming to a decision on the method of reparative surgery to adopt, it was of great importance to consider the individual need of the patient.

DR. DENIS GLISSAN (Sydney) stressed the importance of the final function as a measure of success. He instanced a case of radial palsy which, after very careful assessment and much discussion with the patient, was treated by the standard triple transplant operation. The operation was a failure because the patient preferred the old way of doing things with his hand and he could not be reeducated.

DR. W. DOUGLAS (Brisbane) agreed with other speakers that tendon transplantation had a limited sphere of usefulness. In some cases he felt that a beneficial result was obtained by a tenodesis effect of the transplant, rather than a replacement by an active contractor.

Fractures about the Elbow Joint.

DR. W. R. GAYTON read a paper entitled "The Treatment of Fractures in the Region of the Elbow Joint" (see page 317).

DR. JOHN COLQUHOUN (Melbourne) said that he wished to discuss only fractures about the elbow joint as they occurred in children. Some years previously he had been accustomed to operate when manipulative reduction did not produce entirely satisfactory reposition. He now felt that added operative trauma would often produce more permanent stiffness than some permanent malposition. In difficult cases of supracondylar fracture he felt that balanced traction had merit. In fractures of the head of the radius in children he was conservative, but he would remove the head early if there was gross displacement or comminution.

DR. E. F. WEST (Adelaide) said that most elbow joint fractures were examined in the first instance by a registrar or house surgeon. He felt that they should be instructed to record always the state of the radial pulse and the presence or absence of nerve injury before any manipulation was carried out. He described a method of open reduction of "Y"-shaped fracture of the lower end of the humerus by a posterior muscle-splitting approach and fixation of the fragments by two small vitallium plates.

DR. B. T. KEON-COHEN (Melbourne) advocated early operation with internal fixation in the "baby car" and Monteggia types of fracture. He was accustomed to use an internal splint even when the fractures were compound. With fracture of the olecranon he felt that removal of small proximal fragments and careful suture of the triceps gave excellent results.

DR. LENNOX TEECE drew attention to faulty nomenclature in what was described as a fracture of the lateral condyle of the humerus. He said that that fracture invariably involved the capitellum and part of the trochlear surface as well. Where much rotation had occurred, unless operation was performed, accurate reposition was impossible and non-union inevitable.

DR. JOHN LAHZ (Brisbane) described various techniques for the manipulative reduction of supracondylar fractures. He was of the opinion that with full reduction the fracture was a stable one and redisplacement would not occur with subsidence of swelling. If the radial pulse remained absent after reduction he advocated brachial plexus block before deciding to operate.

DR. L. J. WOODLAND (Sydney) agreed with Dr. Keon-Cohen that excision of portion of the olecranon gave very satisfactory results. He had attempted manipulative reduction of fractures of the external condyle, but had invariably failed.

Sacro-iliac Tuberculous Arthritis.

DR. DOUGLAS PARKER (Hobart) read a paper entitled "Sacro-Iliac Tuberculous Arthritis" (see page 319).

DR. LAURENCE MACDONALD (Sydney) congratulated the speaker on a careful survey of sacro-iliac tuberculosis in Tasmania. He felt that the time was ripe for an evaluation of the late results of surgical tuberculosis throughout Australia. From his experience, he was of the opinion that the disease was neither so acute nor so inevitably damaging in its effects as in Great Britain. He was particularly interested in Dr. Parker's descriptions of aids to diagnosis. Positive X-ray findings were notoriously late in declaring themselves and difficult of interpretation. In any case of sacro-iliac tuberculosis he always made an X-ray examination of the whole spine and in a number of cases had found coexisting spinal caries. Dr. Macdonald went on to say that fusion of the sacro-iliac joint was necessary when the disease became quiescent, and he had been accustomed to advise recumbency immobilization for many months before proceeding to operation—this for fear of precipitating sinus formation, a complication which made the prognosis infinitely worse. He thought that the advent of streptomycin might make surgical procedures safe at an earlier period at the site under discussion as well as in other sites of bone tuberculosis.

DR. JOHN COLQUHOUN (Melbourne) agreed that in Australia human control was the thing to watch for, and that early diagnosis of open phthisis in the adult would greatly lessen the incidence of bone and joint tuberculosis in children. In operation for sacro-iliac fusion he usually used the Verral technique, but he would not condemn the Smith-Petersen operation in spite of the fact that the diseased joint was opened. He had had some encouraging results from local use of streptomycin in tuberculous joints.

DR. R. J. B. MCEWAN (Sydney) said that he was impressed by the number of cases of sacro-iliac tuberculosis quoted by Dr. Parker. At a hospital in England with which he had been associated, statistics showed that of 1219 cases of bone and joint tuberculosis, only 16 were sacro-iliac in situation. He went on to say that he always found interpretation of the disease difficult. In Dr. Parker's series he wondered how many patients had evidence of tuberculosis elsewhere and if routine culture of urine and gastric contents had been carried out.

DR. ERIC PRICE (Melbourne) felt that too much reliance could not be placed on the "upward and medial shift sign". Discrepancies could easily be brought about by faulty posturing.

Slipped Femoral Epiphysis.

DR. E. F. WEST (Adelaide) read a paper entitled "The Treatment of Slipped Femoral Epiphysis" (see page 324).

MELBOURNE PÆDIATRIC SOCIETY.

A MEETING of the Melbourne Pædiatric Society was held at the Children's Hospital, Carlton, Victoria, on May 10, 1950.

Infection in Leuchæmia.

DR. R. ORTON, on behalf of DR. JOHN COLEBATCH, presented the report of a case to illustrate the occurrence and the management of infections in leuchæmia. The case was one of scarlet fever occurring in a girl, aged seven years, with lymphatic leuchæmia. The patient's illness had commenced five weeks before her admission to hospital on January 31, 1950, when she had listlessness and loss of appetite associated later with pallor, palpitations, fever and loss of weight. Examination of the patient revealed a pale, thin child with moderate generalized gland enlargement and with a spleen palpable five centimetres and a liver palpable three centimetres below the costal margins. Examination of the blood and bone marrow smear confirmed the diagnosis; the hæmoglobin value was 38%, the total white cell count was 3000 per cubic millimetre, 720 (24%) being neutrophile cells and 76% lymphocytes, and the platelets numbered 40,000 per cubic millimetre. The patient was given a blood transfusion, and the administration was commenced of procaine penicillin, 300,000 units on alternate days, together with vitamin *B* complex, two millilitres daily. That treatment was continued throughout the period of her stay in hospital. In addition, she was given a short course of folic acid, five milligrammes twice daily, and "Aminopterin", one milligramme daily, a total weekly dose of six milligrammes. After one week the glands and spleen were just palpable, and the number of white cells and platelets had fallen as a result of "Aminopterin" therapy. The hæmoglobin value was 84%, the total white cell count 1400 per cubic millimetre, 210 (15%) being neutrophile cells and 85% lymphocytes, and the platelets numbered less than 10,000 per cubic millimetre.

During the next five weeks the patient's progress was satisfactory. Several minor infections, including boils on the upper lip and nose, paronychia and ulcerative stomatitis, had cleared, and an improvement in appetite and increase in weight were noted. Blood examination showed corresponding improvement, the hæmoglobin value being 82%, the total white cell count 4100 per cubic millimetre, made up of neutrophile cells 1312 (32%) and lymphocytes 68%, and the number of platelets normal. At that time she developed the initial signs of an infection which very nearly proved fatal. Two days after a child in the next bed had undergone a transient throat infection with diarrhœa and a temperature of 104° F., the patient developed anorexia, with cough and vomiting, and complained of a sore throat. Her temperature became elevated (103° F.) and upper cervical glands became swollen and painful. Two days later a diffuse maculo-erythematous rash suddenly appeared over her trunk and limbs, and a provisional diagnosis of scarlet fever was made. Penicillin dosage, which had been increased over the past few days, was raised still further to 800,000 units daily, and streptomycin dosage was raised to 400 milligrammes daily; administration of sulphamezathine, four grammes daily, was commenced. The patient remained semicomatose for five days, with constant hyperpyrexia, in spite of high fluid intake and frequent sponging. Severe cervical adenitis and cellulitis developed, and the cellulitis spread over her face and closed both eyes. The fauces were never more than modrately reddened. Blood examination findings at this point were interesting, notably the sudden loss of granulocytes from the circulating blood with later only slow hæmatopoietic response. The respective blood examinations showed a hæmoglobin value of 78%, a total white cell count of 2200 per cubic millimetre, made up of neutrophile cells 44 (2%) and lymphocytes 98%, and a platelet count of 200,000 per cubic millimetre; in one week the hæmoglobin value was 64%, the total white cell count was 1700 per cubic millimetre, made up of neutrophile cells 813 (49%) and lymphocytes 51%, and the platelets numbered less than 10,000 per cubic millimetre. Recovery was assisted by a further blood transfusion and later surgical drainage of the cervical abscesses. A generalized "branny" desquamation commenced three weeks after the rash appeared. The patient showed steady improvement with gain of appetite and weight and was discharged from hospital to her home after a total of twelve weeks in hospital, her blood picture then being nearer normal than at any other time during her illness. The blood examination at this stage revealed a hæmoglobin value of 82%, a total white cell count of 7600 per cubic millimetre, made up of neutrophile cells 2584 (34%) and lymphocytes 64%, and a normal platelet count. At the time of the meeting she was well and had suffered no further relapse.

Dr. John Colebatch then discussed the subject of infection in leuchæmia, stressing the fact that case histories, such as the one presented, with recurring pyrexia were commonplace in that disease. He said that there were three main problems in the therapeutic attack on leuchæmia: firstly, inhibition of the growth of leuchæmic cells, secondly, the control of hæmorrhage, and thirdly, the control of infection. He had found that the actual or immediate cause of death in treated subjects of leuchæmia might sometimes be a cerebral hæmorrhage, or anæmia from uncontrollable hæmorrhage, or poisoning with an overdose of "Aminopterin". Almost every leuchæmic patient, however, died with some infection, and in the great majority of cases the infection appeared to be the immediate or precipitating cause of death. That finding merited special consideration of the role of infection in the disease.

In the course of investigation of the treatment of leuchæmia, Dr. Colebatch had found, by careful history-taking, that in 17 out of 24 cases the child had been perfectly well until the occurrence of an acute infection, usually of the respiratory tract. In three other cases the onset had been a pyrexial illness of undetermined origin, and in the remaining four cases there was reason to doubt the reliability of the history. The usual early symptoms, such as lassitude, tiring easily and anorexia, were persistent and progressive. It appeared therefore that almost without exception the onset of leuchæmia in childhood was marked by an acute infection. The significance of that initial infection was not known. Dr. Colebatch wondered if it could be related in any way to the actual cause of leuchæmia. He said that according to Andrewes a virus was generally acknowledged to be the causative factor of fowl leuchæmia, which was transmissible to other fowls by cell-free filtrates of leuchæmic tissue. In human beings there was little to suggest a similar ætiology, though the possibility could not be disregarded. It seemed more probable that at the time of the initial infection the child already had a leuchæmic process in the bone marrow and that the acute infection was just an intercurrent infective agent that caused the vulnerable marrow to become hypoplastic. That would result in fatigue, lassitude and anorexia, as in classical aplastic anæmia.

Dr. Colebatch went on to say that in leuchæmia in childhood, as in Hodgkin's disease and reticulosis, febrile episodes were common, apart from the initial infection. In a recent investigation in the Children's Hospital, every patient observed had had at least one such episode of pyrexia, and as a rule the leuchæmic condition had progressed during that period. In an attempt to find the cause of these febrile episodes, several possible explanations had been considered. The first suggestion was that the leuchæmic process itself caused pyrexia. That seemed unlikely, because the fever was intermittent and because it seemed to occur as readily whether "Aminopterin" was used to control the multiplication of leuchæmic cells or not. Another explanation commonly taught was that anæmia caused the pyrexia. That seemed to be more readily disproved by the frequent persistence of the pyrexia after blood transfusion to restore the hæmoglobin to normal, and by the common occurrence of severe anæmia in other disorders without any rise in temperature. A third possibility was that rapid destruction of leuchæmic cells released into the circulation large amounts of protein, perhaps of abnormal kind, causing a febrile reaction. Such a biochemical explanation was suggested by the observations in several recent cases, and it appeared to warrant investigation both in leuchæmic and in so-called aleuchæmic cases.

Dr. Colebatch suggested, however, that the commonest cause of the febrile episodes in leuchæmia was intercurrent infection. Sometimes that was certainly true, when there was an obvious bacterial infection, such as pneumonia or scarlet fever, as in the case described by Dr. Orton. Occasionally a known virus infection had been found to be responsible, such as varicella, rubella and morbilli. In most cases, however, despite a temperature rising to 103° or 105° F., there were no clinical signs of infection, or only minimal signs, such as mild bronchitis, pharyngitis, stomatitis or infection of the skin. There was no neutrophile leucocytosis in those cases and no response to any chemotherapy. Except when the patient was in the terminal week or two of his illness, such totally unexplained febrile attacks were usually self-limited, petering out after seven to fourteen days. Dr. Colebatch asked if those episodes might not be due to intercurrent infection with viruses, either contracted in the ward or lying latent within the patient, like the virus of *herpes simplex*, until activated periodically because of the debilitated state of the patient. Two observations in support of that concept had been made. The first was the frequent presence of stomatitis or cheilitis during such febrile attacks. The

second was the occurrence on two occasions of similar unexplained bouts of pyrexia with lymphocytosis in other children in the ward who had been in close contact with the febrile leuchæmic child.

Another aspect of the subject which Dr. Colebatch discussed was the clinical evidence that leuchæmic patients had a lowered resistance to infection. He said that that was to be expected when the blood picture was far below normal, but to a less extent it seemed to be present even when the blood picture was practically normal. It had to be realized that, although the blood picture might be normal, the bone marrow in leuchæmia was damaged, and it had a very limited reserve or capacity to respond to emergencies. Moreover, in leuchæmia there might be not only a lack of normal neutrophile leucocytes, but also a deficient production of normal lymphocytes and immune globulin substances. In leuchæmic children it was the rule to find a history of recurrent minor infections prior to diagnosis and usually prior to the onset of hæmatological signs.

Finally, Dr. Colebatch referred to the therapeutic indications arising from these observations. He said that acute infection in the leuchæmic child should be treated early and vigorously, streptomycin and other antibiotics being used if penicillin was not rapidly effective. As a prophylactic measure procaine penicillin was useful when the neutrophile cell count in the blood was below 1500 per cubic millimetre. Suspicion that the leuchæmic child had been in contact with certain virus diseases warranted the prompt administration of a full dose of γ globulin or immune serum.

DR. GRAY ANDERSON said that he thought that *herpes simplex* infection might be a cause for febrile attacks in children with leuchæmia, but it was possible for other factors to cause an herpetic eruption. He said that a survey of infections in children which he had seen in America disclosed that each healthy child developed on an average six infections per year and the majority of those were undiagnosable.

DR. JOHN MCLEAN concurred with Dr. Colebatch in the view that infection was an important factor in patients with leuchæmia. He said that frequently the initial onset was by a febrile attack, and many febrile episodes in patients with leuchæmia were due to infections. He thought, however, that leuchæmia alone could cause a rise in temperature. He agreed with Dr. Colebatch that infections must be treated vigorously, as they could cause death very rapidly and could make the patient very uncomfortable. The importance of recognizing and treating infections could not be overstressed now that new drugs were being discovered that could partially control the leuchæmic process and prolong life.

Refractory Rickets.

DR. MOSTYN POWELL presented a family with vitamin-resistant rickets. He said that the continent of Australia had provided such bounty in the way of good climatic and dietetic conditions that the incidence of ordinary vitamin-deficiency rickets was extremely low. The almost universal use of vitamin supplements might also be a factor contributing to the very low incidence of rickets. When rickets did appear it was, therefore, likely to be of unusual type; in fact there was a tendency for the unusual to become the usual. Dr. Powell said that the patients he was about to present illustrated, first, the condition known as vitamin-resistant rickets, second, an occasional feature of that condition—a familial incidence, and third, the syndrome of hypervitaminosis *D*. The story was simple enough; it even verged on the monotonous.

In February, 1947, Robert B., aged then two years, had been taken to see Dr. Eric Price because of bow legs. Dr. Price had diagnosed rickets and referred him to Dr. Vernon Collins, who had little alternative but to confirm the surgeon's diagnosis. The child was a full-time, normal baby, breast-fed for four and a half months, and then fed on "Lactogen". The only suspicious dietary upset was caused by an attack of eczema, for which he was taken off orange juice, cereals, cabbage, parsnips, cauliflower and peas for several months late in his first year—these had been restored later. He had been given "drops" for his vitamins during this period. He lived in good open surroundings on a poultry farm in Templestowe and had plenty of sunlight. Although his appetite was always capricious, his diet was reasonable. An important point was that his mother had a "rickets deformity" at the age of six, an uncle on the mother's side was at that time being treated at the Royal Melbourne Hospital for gross ricketty deformities, and the maternal grandmother had been operated on fifty-five years before for deformities of the legs. Examination of the child showed pronounced bowing of the legs, beading of ribs, and X-ray changes of trabeculation, bowing, cupping and widening of the epiphyseal lines with some fragmentation of the epiphyses. Fragmentation of tibial, femoral, radial and ulnar diaphyses suggested an element of scorbutic change. He was ordered calciferol 0·5 milligramme daily (vitamin *D* 20,000 units) and a full diet; later that was changed to "Olvita D" 18 drops (vitamin *D* 36,000 units), and his progress was watched. No biochemical tests were performed at that stage, but in July, 1947, the serum calcium content was 15·2 milligrammes *per centum*, the phosphorus content was 2·2 milligrammes *per centum* and the serum protein content was 5·5 grammes *per centum*. The phosphatase value was not estimated. Progress of the child's rickets was relatively slow, but by August, 1947, six months after commencement of therapy, there was radiological evidence of healing. Dr. Powell said that healing had progressed at a slow rate, the most improvement being in the non-weight-bearing areas, namely, the lower ends of the radius and ulna. Bowing of the tibiæ did not decrease in spite of splinting, and the deformity was treated by osteoclasis in November, 1949. The patient had been receiving 50,000 units of vitamin *D* daily for the past year.

The next child was Rosemary, who was some two years younger than Robert. She had been approximately a full-time normal baby and was breast fed for three months. Because of the family history she was submitted to X-ray examination at the age of five months, when slight but definite changes were seen in all the long bones. The appearances were similar to, but less severe than, Robert's. She was given 25,000 units of vitamin *D* per day (12 drops of "Olvita D"), and later 50,000 units daily. Radiological progress was slow; in fact, at one stage there appeared to be recession in healing, but after fifteen months of treatment much improvement had occurred, especially in the radial and ulnar epiphyses. She, like Robert, had gross bowing of the legs, and as they did not improve with splinting, osteoclasis was performed in April, 1949, when she was aged two and a quarter years.

Dr. Powell said that in March, 1949, the mother announced that she was to have a third baby in December. She was advised to take 30 minims of "Penta Vite" (adult formula) daily. That baby, Allison, was apparently normal and was given "Penta Vite", 15 minims daily, from the age of two months; but X-ray examination at the age of eight months showed definite evidence of early rickets. She was ordered "Olvita D" 24 drops daily (vitamin *D* 50,000 units), and the rhachitic changes were rapidly controlled by those means. She had, however, manifested certain symptoms over the past three to four months which indicated a toxic reaction to the high vitamin dosage. Those symptoms had been thirst, polyuria, irritability, anorexia, vomiting and loss of weight, and there seemed to be definite itchiness present, with an erythematous rash at times. In fact, the whole picture was very reminiscent of pink disease. The urine had been found to contain occasional pus cells, calcium oxalate crystals and urates, but no albumin. The serum calcium content had risen to the high level of 15 milligrammes *per centum* and the phosphorus content to eight milligrammes *per centum*. The vitamin *D* therapy had, therefore, been stopped temporarily and would be resumed later on a level to be determined.

Dr. Powell went on to say that the course of the patients presented followed the lines of that of the patient of Albright, Butler *et alii* reported in 1937—a boy, aged sixteen years, who had suffered from rickets from the age of one year in spite of treatment with ordinary doses of vitamin and who responded when huge doses were finally given. In an extensive series of investigations on the patient they had shown several things: (i) Section of the sternum had provided microscopic evidence of true rickets (the great width of the osteoid seams covering the bone trabeculæ and the absence of fibrosis and osteoclasts, which distinguished the condition from *osteitis fibrosa*, renal rickets *et cetera*). (ii) The metabolic data in relation to calcium and phosphorus metabolism were the same as for ordinary rickets. (iii) Secondary hyperparathyreoidism was present, which maintained the serum calcium content at a reasonable level and the phosphorus content at a very low level; removal of one of the parathyreoid glands of that patient produced an immediate fall in the serum calcium level with tetany indicating that the parathyreoids were producing close to their maximum supply of hormone. (iv) Intravenous injection of crystallized vitamin *D* and ultra-violet irradiation failed, and, therefore, the condition was not due to failure to absorb vitamin *D* from the bowel. (v) It was noticeable that when the rickets was under control the serum calcium and phosphorus levels rose greatly, and the urine was loaded with calcium and contained many calcium casts such as were seen in primary hyperparathyreoidism; dosage of the vitamin was then drastically curtailed. (vi)

It was considered that the disease, which closely resembled the ordinary rickets of childhood, could not be called a true deficiency disease, but was rather an intrinsic resistance to the antirhachitic action of vitamin *D*; the exact mechanism by which vitamin *D* worked was obscure, but two actions appeared to be established—(*a*) an increase of absorption of calcium from the bowel (which might lessen the stimulus to parathyreoid activity), and (*b*) an increase in the tubular reabsorption of phosphorus. It had also been suggested that there might be in resistant rickets a distorted liver action, in which the vitamin was either stored to excess or inactivated.

Dr. Powell concluded with the following points in summary: the family presented had the condition known as vitamin-resistant rickets; a pronounced familial incidence was evident; control of the rickets appeared to have been established in the three children; the youngest child had hypervitaminosis *D*, with symptoms of thirst, polyuria, anorexia, vomiting, skin rashes, skin irritability and general misery, and very high serum calcium and phosphorus levels; the problem of management was to find a dose sufficient to control the rickets, but insufficient to produce toxic manifestations, for it might be possible with the hypercalcæmia present to produce nephrocalcinosis and ultimate renal failure.

DR. V. L. COLLINS agreed with Dr. Powell that the difficult problem of management was to decide what was the correct dose of vitamin *D* and then how long the dose should be continued. It was possible to get symptoms of hypervitaminosis *D* and yet have tardy healing of the rickets.

Pulmonary and Abdominal Hydatid Cysts.

DR. ROBERT SOUTHBY showed a patient, a boy, aged six years, with a pulmonary and an abdominal hydatid cyst. Six weeks previously the boy had been admitted to West Gippsland Hospital, Warragul, on account of abdominal pain of four days' duration, fever and diarrhœa. The abdomen had been distended and was dull to percussion, except in the epigastrium, and he presented the picture of a patient with subacute intestinal obstruction. That illness seemed to respond to medical treatment after two days, and the fever gradually subsided. In addition, there were signs suggesting the presence of a mass in the right side of the chest anteriorly. The urine was normal, the leucocyte count was 7000 per cubic millimetre, and the differential count and film examination revealed no significant changes. A hydatid complement-fixation test and a Casoni test both produced negative findings. It was considered that there was some "free" fluid in the peritoneal cavity, but paracentesis did not confirm that opinion. One week later Dr. Southby had examined the patient in consultation; the patient presented the features of a rather large, slightly tense, cystic swelling placed more to the left side of the abdomen, and some dulness in the right side of the chest, especially anteriorly and in the axilla, but not extending to the posterior aspect. The condition suggested the possibility of a localized collection of fluid or a cystic swelling. An excretion pyelogram was reported as showing normal renal pelves and ureters, so that it was considered that hydronephrosis could be excluded. The only relevant features in the past history were that the patient had suffered from a short attack of "gastritis" three years earlier, and that during the past eighteen months he had been noticed to be rather pale, and to tire somewhat easily with exertion, although there had been no shortness of breath at any time.

The patient was transferred to the Children's Hospital on April 17, and examination showed similar signs. The tentative diagnosis was hydatid cysts of the abdomen and right chest-cavity. Further investigations were carried out with the following results. Blood examination revealed a hæmoglobin value of 90%, and a total leucocyte count of 11,900 per cubic millimetre, 56% being neutrophile polymorphonuclear cells, 40% lymphocytes and 4% eosinophile cells. The serum failed to react to the Wassermann, Kahn and hydatid complement-fixation tests. The result of a Casoni test was negative. The following X-ray report was made:

> Chest. There is a large rounded opacity in the right lung occupying the whole of the right middle lobe and expanding it. The appearance would be consistent with an unruptured hydatid cyst.
>
> Abdomen. No abnormal opacity seen in the abdomen. The right hemi-diaphragm is rather high, but smoothly elevated, and this may be related to the presence of lung pathology and not necessarily due to any subphrenic mass.

A cystogram was reported as being normal in appearance.

Dr. Southby said that the child's general condition had improved and, except for a period of forty-eight hours in the week before the meeting when he was febrile, there had been no fever for the previous three weeks. He had been seen in consultation by Dr. Russell Howard, who had agreed with the diagnosis of hydatid cysts and would operate in the next few weeks.

DR. MURRAY CLARKE said that he thought that the abdominal cyst could easily be a cyst in the liver, as he was unable to palpate the upper aspect of the cyst clearly from the liver. He had examined a patient previously in whom a hydatid cyst was in the lower half of the abdominal cavity; on exploration it was found to be a huge cyst in the liver which had grown downwards.

DR. HOWARD WILLIAMS considered that it was unusual for both the hydatid complement-fixation and Casoni tests to give negative results with two hydatid cysts of the size under consideration.

Osteogenesis Imperfecta Congenita.

DR. M. WADDS, in presenting a patient with *osteogenesis imperfecta congenita*, said that the form of *osteogenesis imperfecta* affecting older children was encountered with reasonable frequency, but the congenital form was met with sufficiently rarely to merit presentation of the patient when it occurred. *Osteogenesis imperfecta* was a developmental disease of the skeleton that began in fœtal life. It was characterized by a tendency of the bones to fracture, relaxation of the ligaments, and in the hereditary types deafness due to otosclerosis in the third and fourth decades. The disease was classified into two main types, the hereditary and the non-hereditary. The patient belonged to the latter group. The family history of the patient did not reveal the presence of bone fragility, blue sclerotics, deafness or exophthalmos in either parent or relatives. The father was the second child in the family; his elder brother's first child had a *spina bifida*. The mother was a young *primipara* under the care of one of the suburban clinics. Her pregnancy had been normal but for breech presentation, for which a version was performed late in pregnancy. No movements were felt for four days after version. X-ray examination of the fœtus was carried out at that time. Delivery was normal at term.

The baby had been transferred to the care of Dr. Kate Campbell when six days old. Examination then revealed a sweating baby with all the characteristic features of *osteogenesis imperfecta*. The skull was broad. The frontal bones were ossified in the lower portion, while the upper portion of the frontal and the parietal bone showed eggshell crackling in some areas and in others was almost membranous. The fontanelles and sutures were widely open. The ears were directed downwards and outwards. The eyes were prominent with a bluish tinge of the scleræ. The tympanic membranes were also bluish. The neck appeared short. A soft systolic bruit could be heard over the pericardium. The left humerus and right femur showed recent fractures with crepitus, and an old fracture with callus formation was evident in the right humerus and left femur. There was obvious deformity of all limbs, clavicles and ribs. The following report was made on X-ray examination of the bony skeleton:

> Multiple healing fractures in clavicles, ribs, right humerus, left forearm and left femur. Recent fractures in the right femur and left humerus and right forearm. There is no development of membranous bone of any significance in the skull. The actual bone densities are fair, but presumably this is a case of "osteogenesis imperfecta".

The X-ray film, taken after the version, was then reexamined and found to show a fracture of the right humerus. On the twenty-first day of life petechiæ appeared on the legs and buttocks. Blood examination revealed a normal bleeding time, clotting time and platelet count and a slight hypochromic anæmia.

Dr. Wadds said that it was interesting to note that the child showed possible faulty development in many of the structures derived from mesoderm—the skeletal system, cardio-vascular system, sclerotics and tympanic membranes. Two features were of interest in this case history, namely, the history of malformation of the first child of the father's brother and the widespread capillary fragility occurring in the baby presented.

DR. KATE CAMPBELL commented on some features of the patient. She said that the family history was very interesting, and she thought that probably some of the fractures had resulted from the version that was carried out. The purpuric eruption was probably the result of an

extremely fragile capillary wall. Dr. Campbell thought that the skin was very inelastic, and that that feature accounted for its unusual feel on palpation.

DAME JEAN MCNAMARA showed the X-ray films and gave a brief clinical description of a patient with *osteogenesis imperfecta* that she had recently examined. In her case the bony structure was grossly defective, and there seemed to be no definite architecture of either cancellous or cortical bone as determined radiologically. She wondered if there was any relationship between *osteogenesis imperfecta* and *fragilitas ossium*.

THE SAINT VINCENT'S HOSPITAL ASSOCIATION.

THE Saint Vincent's Hospital (Sydney) Association will hold its annual reunion from October 18 to 21, 1950.

Special Correspondence.

CANADA LETTER.

FROM OUR SPECIAL CORRESPONDENT.

ANNOUNCEMENT has just been made of the conferring of an Honorary Doctorate on the Right Honourable Robert Menzies, Prime Minister of Australia, by the University of British Columbia, at Vancouver.

Of interest to Australians is the fourth annual report of the Air Ambulance Service sponsored by the Province of Saskatchewan, in which this pioneer service is credited with flying one and a half million miles in the transportation of 3000 patients. The most recent trend is the flying in of doctors to rural areas to perform operations, though, of course, the main burden of the work is the transportation of patients to recognized medical centres. The average round-trip distance today is 264 air miles, so that one can readily imagine the very great saving in time when contrasted with the doubtfully available surface transportation. The division of labour is interesting in that one very fast all-weather instrument-flying plane is used between airports, two "work-horses" are used for the slower business of getting patients out of the remote but level farm areas, while one ski-equipped plane is reserved for winter work alone. Needless to say the latter is the most welcome in the far north.

Still on the Saskatchewan scene, one notes with some pleasure the naming of more and more lakes and landmarks in the unexplored northern parts of the Province in memory of men killed in the services; and more recently for doctors who have served their people so well over the years.

The death is announced of the much beloved Charles Burlingame, President and Psychiatrist-in-Chief of The Institute of Living, formerly known as the Hartford Retreat in Connecticut. Dr. Burlingame played a dynamic role in the development of the Presbyterian Hospital and Columbia University Medical Centre in New York before tackling his biggest job, that of directing the Retreat at Hartford, established in 1822. The calibre of the post-graduate lectures given in this mental hospital, and the development of research skills and neurosurgical approaches to mental disease marked it as one of the most advanced institutions in North America.

A recent survey by Dr. Thomas A. Lebbetter, of the Winnipeg Clinic, sets the number of "group practices" in Canada at 127. In the United States of America there are about 370 such groups. The advantages of pooling overhead, experience and risks have for a long time been realized, though the public often assumes that only very large groups such as the Mayo Clinic, Lahey Clinic or Cleveland Clinic practise in this manner. One of the unique features for the Winnipeg Clinic is the fact that no real estate, such as clinic building, hospital or offices is held as property by the clinic, but is deeded to the specially incorporated "Manitoba Institute for the Advancement of Medical Education and Research", designed to foster these aims within the University of Manitoba. Membership in this clinic does not depend on a doctor's ability to put up large amounts of money to join, nor can membership be assigned, bought or sold.

The development of small locally operated anti-alcoholic foundations in Canada and the United States of America is a matter of great rejoicing by many of the victims of alcoholism, particularly that amazing group, Alcoholics Anonymous. The growth of such rehabilitation and active treatment clinics stems from the overwhelming difficulty of getting any patient into a hospital bed today as an emergency, particularly an alcoholic case. The Dudley Saul Clinic at Saint Luke's Hospital, Philadelphia, has built up a great mass of information on the occurrence and incidence of alcoholism, the source of the patients and their socio-economic background. The assessment of new treatments is possible in such a setting, and with university cooperation, such a clinic can become an important demonstration and training centre for nursing and medical personnel. The Knickerbocker Hospital in New York has shown, over the past five years, that it is possible to run such a clinic within a general hospital, and that it is possible to interest nurses in taking such cases. Their 18-bed unit has treated 5000 alcoholics in five years, of whom 3000 are now members of Alcoholics Anonymous and thus helping with the highly personalized work which this organization performs for alcoholics. No readmissions are permitted. Five days is the average stay, at a cost of $15 per day. All patients must arrive at the hospital with a "sponsor" and the cash.

Correspondence.

THE DISMISSAL OF DR. P. R. JAMES.

SIR: I have not yet seen any reference in THE MEDICAL JOURNAL OF AUSTRALIA to the dismissal of Dr. P. R. James, although it is of the gravest importance to members of the medical profession. The facts of the case, as given below, are taken from *Hansard* and from the Melbourne *Argus*.

Dr. James graduated in 1941; from then to the end of the war he served with the army, part of the time in New Guinea and the Pacific islands; since the war he has been on the staff of the Repatriation General Hospital, Heidelberg. On May 29, on the instruction of the permanent head of the Public Service Board, he was given notice of dismissal, as from June 7. No misconduct, nor slackness in duty was alleged; in fact, he had recently forgone his leave for the sake of carrying on his work, yet the instructions were that he would "not be eligible for pro rata payment in lieu of recreation leave". He has been given no reason for his dismissal; he has asked for, and been refused, an open inquiry; an inquiry has been demanded in Parliament, and refused. Many questions have been asked in the House, some of which have been evasively answered, while the accuracy of other answers has been denied. It was stated in the House that security officers had, without authority, tried to search Dr. James's home, and, at the hospital, had confiscated a petition for his reinstatement.

Dr. James is a member of the Australian Peace Council and of the Democratic Rights Council; he denies that he has ever been a member of the Communist Party, though even if he were, it would be irrelevant, until Mr. Menzies's bill becomes law. Democratic bodies, alarmed at the summary dismissal of a medical officer without any accusation of misconduct, but with the strong presumption of political bias, have been pressing for his reinstatement, pending an inquiry. In the *Argus* of July 21 it is reported from Sydney that the Federal and State Public and Essential Services Council consider the form of the dismissal "a threat to the security of all public servants, and indicates the danger inherent in all repressive legislation and regulations".

Many of our members are in the public service, and many more are local repatriation medical officers. In view of Mr. Menzies's definition of a "communist", which could apply to anyone who believes in a cooperative rather than a competitive form of society, and in view of his published statements that no "communist" would be allowed to remain in the public service or to be paid fees by the Commonwealth, it is fair to inquire what our councils are doing to protect those of us who are liable to be attacked by the present Government, as soon as Mr. Menzies's bill becomes law—or, apparently, even before that. I would stress that the Government have never denied that Dr. James was dismissed for his political views; in fact, one supporter of the Government interjected during a debate, "He's a comm.", as if that explained everything.

My point is that our councils should be prepared to defend any doctor who is attacked because of his political beliefs,

provided his professional ability and conduct are satisfactory, and he behaves as a decent, law-abiding citizen. I hope that even the most conservative members of our councils would not hold that a man should be deprived of his livelihood because he believed in peace and democracy.

Yours, etc.,

E. P. DARK.

Katoomba,
August 5, 1950.

THE OCCURRENCE OF UNUSUAL POSITIVE COOMBS REACTIONS AND M VARIANTS IN THE BLOOD OF A MOTHER AND HER FIRST CHILD.

SIR: In your issue of December 31, 1949, you published our paper, "The Occurrence of Unusual Positive Coombs Reactions and M Variants in the Blood of a Mother and Her First Child". We think that the following further information about this interesting family should be recorded. On June 14, 1950, the third child of Mrs. McI. was born at term. Its blood group is ARh(D) positive, its Coombs reaction is positive (as is that of the mother and the first child, but not that of the second child). The third child also resembles the mother and the first child in having an M gene, the mother's genotype being NM_2, and that of the first and third children being presumably MM_2, while that of the Coombs-negative second child is MN. The two elder children are boys, and the third a girl.

Yours, etc.,

RACHEL JAKOBOWICZ.
LUCY M. BRYCE.
R. T. SIMMONS.

Melbourne,
August 11, 1950.

Post-Graduate Work.

THE UNIVERSITY OF QUEENSLAND POST-GRADUATE MEDICAL EDUCATION COMMITTEE.

ANNUAL REPORT.

THE University of Queensland Post-Graduate Medical Education Committee has pleasure in presenting its annual report for the year ended June 30, 1950—a record year in many phases of its activities, particularly in visits to country centres.

Representation.

The following are the members of the committee: Dr. A. V. Meehan, Chairman, representing the Royal Australasian College of Surgeons, Dr. Alex. Murphy, Vice-Chairman, representing The Royal Australasian College of Physicians, Professor H. J. Wilkinson, Professor A. J. Canny and Professor G. Shedden Adam (Senate of the University of Queensland), Dr. Alan E. Lee, Dr. Harold R. Love and Dr. J. R. S. Lahz (Queensland Branch of the British Medical Association), Dr. B. N. Adsett, Dr. Herbert Earnshaw and Dr. N. V. Youngman (Part-Time Medical Officers Association, Brisbane General Hospital), Dr. P. A. Earnshaw and Dr. F. J. Booth (Mater Misericordiæ Hospital honorary medical staff), Dr. A. Pye (Brisbane and South Coast Hospitals Board), Dr. R. G. Quinn (Medical Board of Queensland), Professor W. V. Macfarlane and Dr. Ellis Murphy (coopted members).

Changes in personnel during the year included the appointment by the British Medical Association of Dr. J. R. Adam to replace Dr. Felix Arden, and Dr. J. R. S. Lahz to replace Dr. Adam; the Part-Time Medical Officers Association appointed Dr. B. N. Adsett and Dr. Herbert Earnshaw to replace Dr. Alec. Paterson and Dr. S. G. Suggit.

Country Tours.

The committee appreciates the help given by members of the profession who have so willingly cooperated in visiting country centres. These visits are made on the request of doctors living too far distant from Brisbane to enable them to take part in post-graduate work in the city, and who are anxious to be kept abreast of any new developments in diagnosis and treatment.

The following are centres visited during the past twelve months, new centres being Warwick (requesting quarterly visits), South Coast (bi-monthly lectures) and Bundaberg (preferring a series of two or three lectures on the same subject at fortnightly intervals, twice a year).

Ipswich: Dr. H. R. Love, Dr. C. A. Thelander, Dr. L. I. Burt.

South Coast (Southport): Dr. F. Arden, Dr. L. D. Walters, Dr. Lloyd Simmonds.

Bundaberg: Dr. P. A. Earnshaw.

North Eastern (Lismore): Dr. A. G. Cooper, Dr. D. Yeates.

Rockhampton, Mackay, Townsville, Cairns: Dr. Alan Lee and Dr. Ellis Murphy; Dr. John Woodley and Dr. C. Leggett; Professor G. Shedden Adam.

Cairns: Dr. A. G. Cooper.

South Burnett (Kingaroy): Dr. L. D. Walters.

Downs and South Western (Toowoomba): Dr. John Lynch.

Warwick: Dr. B. L. W. Clarke, Dr. H. W. Horn, Dr. Norman Sherwood.

Charleville: Dr. A. G. Cooper.

Sponsorship.

Many inquiries have been received from doctors wishing to proceed to the United Kingdom to further their experience or to study in preparation for higher degrees and diplomas. Applicants approved for sponsorship by the committee have been greatly helped by the British Post-Graduate Medical Federation in securing places in the desired courses and obtaining accommodation.

The following are the sections of medicine for which vacancies in courses were secured:

Diploma of Child Health: Dr. J. W. Woodburn, Dr. J. R. H. Watson, Dr. V. B. Henry.

Membership of the Royal College of Physicians: Dr. D. A. Henderson, Dr. A. J. Mooney, Dr. R. Sawers, Dr. K. Aaron, Dr. N. Y. McCallum, Dr. D. G. Neill.

Anæsthetics: Dr. Joan Dunn.

General medicine: Dr. P. J. Landy, Dr. H. G. Wilson.

General surgery: Dr. Jeffrey Watson, Dr. M. Carseldine. Fellowship of the Royal College of Surgeons: Dr. D. G. Lane, Dr. W. S. Georgeson.

Diploma of Clinical Pathology: Dr. J. C. Squires, Dr. D. G. Neill.

Membership of the Royal College of Obstetricians and Gynæcologists: Dr. V. B. Henry.

Post-Graduate Courses.

Classes in preparation for Part I of the diploma in psychological medicine were continued. Three candidates were successful in passing the examination for Part I.

Neurology, psychopathology, social psychiatry, child psychiatry, speech disorders and electroencephalogram lectures have now been completed for Part II of the diploma.

Anatomy lectures suitable for candidates for Part I M.S. or Part I F.R.A.C.S. were commenced in April, the course consisting of 20 two-hour weekly lecture-demonstrations. A course of 30 physiology lectures commenced in June. The committee would like to thank the lecturers for their continued service.

Queensland Post-Graduate Medical Journal.

The first number of the *Queensland Post-Graduate Medical Journal* was published in December, 1949, and the second is in the hands of the printer. This journal is distributed, free of cost, to all medical practitioners in Queensland. Copies are sent also to the British Post-Graduate Medical Federation, all post-graduate committees in Australia, and to the New Zealand Post-Graduate Committee.

The journal has been well received and has enlisted much interest. We feel it will fill a most useful function in post-graduate education in Queensland.

Visiting Lecturers.

Professor F. A. E. Crew, Professor of Public Health, University of Edinburgh, visited Brisbane in September, 1949, and delivered two lectures to the medical profession and one public lecture: "The Changing Emphasis in Medicine", "The Contributions of Genetics to Medicine" (published in the June number of the *Queensland Post-*

Graduate Medical Journal); the title of the public lecture was "Biological Aspects of Marriage".

On Wednesday, May 3, 1950, Dr. O. T. Clagett, of the surgical staff, Mayo Clinic, lectured on "The Suppurative Diseases of the Lungs", followed by Dr. Lee Eaton, diagnostician of the Mayo Clinic neurological department, on "Myasthenia Gravis: Its Diagnosis and Management".

Professor F. J. Brown, until recently Professor of Obstetrics and Gynæcology at University College Hospital, London, lectured to the profession immediately before congress, his subject being "Chronic Hypertension in Pregnancy".

Dr. Daniel Blain, Director of the American Psychiatric Association, visited Brisbane for congress, but time did not permit him to give an independent lecture to the general body of the profession.

The Australasian Medical Congress was held in Brisbane at the time when the committee usually arranged its annual post-graduate week. The large number of doctors who attended congress derived great benefit and stimulus to their work from attendance at the lectures and discussions held in the various sections.

Federation.

A meeting of the Post-Graduate Medical Federation was held in Brisbane on Saturday, May 29, 1950, when Professor H. J. Wilkinson and Dr. P. A. Earnshaw represented the Queensland Committee.

It was announced by the chairman, Colonel A. M. McIntosh, that a gavel has been presented to the Federation by Dr. William C. Gibson, of Canada; the gavel was made from wood from the birthplace of Sir William Osler, which has now been burnt down. The gavel has a silver plaque on which is inscribed "1848-Osler-1948".

Many items of post-graduate medical interest were discussed from a Federation viewpoint.

Conclusion.

The committee meets regularly on the fourth Thursday in each month. The meetings are always well attended by the members, who have a keen desire to promote the best interests of medical education in this State.

Our activities, particularly the visits of Brisbane doctors to country centres, are largely made possible by an annual grant from the Queensland State Government.

The committee desires to thank the Queensland Branch of the British Medical Association for the continued use of office space and equipment.

A. V. MEEHAN, Chairman.
P. H. MACINDOE, Director.

THE POST-GRADUATE COMMITTEE IN MEDICINE IN THE UNIVERSITY OF SYDNEY.

Week-End Course in Pulmonary Tuberculosis.

THE Post-Graduate Committee in Medicine in the University of Sydney wishes to announce that applications to attend the week-end course in pulmonary tuberculosis to be held on Saturday and Sunday, September 9 and 10, 1950, beginning at 2 p.m. on Saturday, must be received at the office not later than Friday, September 1, 1950. If by this date a sufficient number has not applied, arrangements for the course will be cancelled. Fee for attendance is £2 2s., and all applications, enclosing remittance, should be forwarded to the Course Secretary, the Post-Graduate Committee in Medicine, 131 Macquarie Street, Sydney, from whom programmes may be obtained.

Course of Demonstrations in Surgical Pathology.

A series of twelve demonstrations in surgical pathology will be conducted by Dr. J. P. O'Brien, Post-Graduate Lecturer in Pathology, in the Pathology Department, New Medical School, between October 3 and November 10, 1950. These demonstrations, lasting approximately one and a half hours each, will be held twice weekly at 4 p.m. on Tuesdays and Fridays and will cover the following subjects: the pathology of the skin, uterus, alimentary tract, testis and prostate, breast, thyreoid gland, connective tissue and bone, cross infection, reticuloses and reticulosarcoma, and the adrenal gland and the nervous system. Fee for attendance is £6 6s., and those wishing to enrol are requested to make application to the Course Secretary, the Post-Graduate Committee in Medicine, 131 Macquarie Street, Sydney, enclosing remittance. Programmes are now available on request. Telephones: BU 5238, BW 7483.

NUFFIELD FOUNDATION DOMINION TRAVELLING FELLOWSHIPS.

THE Nuffield Foundation will continue in 1951 its scheme of offering a number of travelling fellowships to Australian graduates. The awards available will be three fellowships in medicine, two fellowships in the natural sciences, one fellowship in the humanities, and one fellowship in the social sciences.

The purpose of the fellowships is to enable Australian graduates of outstanding ability to gain experience and training in the United Kingdom in their chosen fields, and to make contact there with scholars working in those fields with a view to the Fellows' equipping themselves to take up senior posts in research and teaching in Australia.

The fellowships are intended for men or women of first-rate intellectual and personal qualities, who have already shown unusual capacity to advance knowledge and teaching in one of the fields concerned. Candidates must be Australian nationals, normally between the ages of twenty-five and thirty-five years, and must be university graduates holding, preferably, a master's or doctor's degree, and having subsequently had a year or more of teaching or research experience on the staff of a university or comparable institution.

A fellowship will normally be tenable for one year, but in exceptional cases may be extended for a further period of a few months. The fellowship will provide for return travelling expenses of a Fellow between his home residence and the United Kingdom, and, if he is married, similar expenses for his wife; an adequate allowance will be made for the Fellow's living and travelling expenses in the United Kingdom and for his academic fees, books and other incidental expenses, as well as a personal allowance. The total value of an award, including all travelling expenses, varies with needs and family responsibilities of the holder, but will in no case be less than £900.

A Fellow will be expected to resume residence in Australia on the completion of the fellowship.

Except with the express permission of the trustees of the Foundation, a Fellow may not hold any other award concurrently with the fellowship.

A Fellow will be required to carry out, at centres approved by the trustees of the Foundation, a programme of research work and training similarly approved. Other work, paid or unpaid, may not be undertaken without the permission of the trustees. During the tenure of the fellowship a Fellow will not normally be permitted to prepare specifically for, or to take, examinations for higher degrees or diplomas awarded by bodies in the United Kingdom.

A Fellow will be required to submit to the trustees, at the end of the fellowship, a report on his work during the fellowship.

Should the trustees at any time find that a Fellow neglects or has neglected the obligations of the appointment, they shall have power immediately to terminate the fellowship.

The fellowships will be awarded by the trustees of the Foundation on the recommendation of its advisory committee in Australia.

Applications for fellowships to begin in 1951 should be submitted not later than November 1, 1950, to the Secretary, Nuffield Foundation Australian Advisory Committee, c.o. the Australian National University, Canberra, A.C.T., from whom copies of the form of application may be obtained.

Naval, Military and Air Force.

APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Numbers 34, 42 and 46, of June 15, July 20 and August 10, 1950.

CITIZEN NAVAL FORCES OF THE COMMONWEALTH.

Royal Australian Naval Reserve.

Appointment.—Frederick Arthur Stenning is appointed Surgeon Lieutenant (on probation), dated 4th May, 1950.

AUSTRALIAN MILITARY FORCES.

Citizen Military Forces.

Northern Command: First Military District.

Royal Australian Army Medical Corps (Medical).—1/13218 Captain J. W. Woodburn is seconded whilst undergoing post-graduate studies in the United Kingdom, 1st July, 1950.

Southern Command: Third Military District.

Royal Australian Army Medical Corps (Medical).—3/50087 Major H. J. B. Stephens is appointed from the Reserve of Officers and to be Temporary Lieutenant-Colonel, 11th April, 1950. The provisional appointment of 3/101810 Captain K. G. Chatfield is terminated, 22nd April, 1950.

Western Command: Fifth Military District.

Royal Australian Army Medical Corps (Medical): To be Captain (provisionally), 19th June, 1950.—5/26459 Victor Thompson White.

Tasmanian Command: Sixth Military District.

Royal Australian Army Medical Corps (Medical).—6/15338 Major C. W. Clarke is appointed from the Reserve of Officers, is appointed to command 12th Field Ambulance and to be Lieutenant-Colonel (provisionally), 2nd June, 1950.

Reserve Citizen Military Forces.

Royal Australian Army Medical Corps.

1st Military District.—The notification respecting Captain (Honorary Major) P. J. Monahan which appeared in Executive Minute No. 188 of 1947, promulgated in *Commonwealth Gazette,* No. 241, of 1947, is withdrawn. To be Honorary Captain, 7th June, 1950: Geoffrey Charles Treadgold Kenny. To be Honorary Captains, 28th June, 1950: Graham Ricketts, William Howard Tait, John Gordon Byth and Douglas John Chapman.

3rd Military District: To be Honorary Captains.—Kenneth George Chatfield, 23rd April, 1950, and William Charles Boake, 23rd May, 1950.

4th Military District: To be Honorary Captain, 2nd May, 1950.—Stephen Charles Milazzo.

Australian Medical Board Proceedings.

NEW SOUTH WALES.

THE undermentioned have been registered, pursuant to the provisions of the *Medical Practitioners Act,* 1938-1945, of New South Wales as duly qualified medical practitioners:

Gore-Grimes, Maureen Cecilia Elizabeth Bridget, M.B., B.Ch., 1935 (Univ. Dublin), c.o. Head Office, Bank of New South Wales, Sydney.

Hunt, John Gordon, M.B., B.S., 1943 (Univ. London), Immigration Centre, Uranquinty.

Cahill, Michael Edward, M.B., B.S., 1950 (Univ. Sydney), Base Hospital, Wagga Wagga.

Caldwell, Maxine Margaret, M.B., 1950 (Univ. Sydney), Blue Mountains District Hospital, Katoomba.

Gluckstern, Geo Gideon, M.B., B.S., 1950 (Univ. Sydney), District Hospital, Wallsend.

Kennedy, John Anthony, M.B., B.S., 1950 (Univ. Sydney), Lewisham Hospital, Lewisham.

Killen, John William, M.B., B.S., 1950 (Univ. Sydney), Base Hospital, Tamworth.

McLaughlin, Brian Luden Barden, M.B., B.S., 1950 (Univ. Sydney), Mater Misericordiæ Hospital, Waratah.

McManis, Francis Keith, M.B., B.S., 1950 (Univ. Sydney), Royal North Shore Hospital, St. Leonards.

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED AUGUST 5, 1950.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.[2]	Australian Capital Territory.	Australia.[3]
Ankylostomiasis	*	..	1	..	5	..	..	..	6
Anthrax	*	..	..	..	..	..	..	..	..
Beriberi	*	*	*	*	*	*	..	*	..
Bilharziasis	*	..	..	..	..	..	..	..	..
Cerebro-spinal Meningitis	4(4)	2(1)	..	1(1)	..	..	..	..	7
Cholera	..	..	..	..	..	..	..	..	..
Coastal Fever(a)	*	*	*	*	*	*	*	*	..
Dengue	*	*	*	*	*	*	..	*	..
Diarrhœa (Infantile)	..	..	..	..	..	..	..	..	..
Diphtheria	8(1)	5(2)	6(4)	..	3(3)	1(1)	..	..	23
Dysentery (Amœbic)	*	..	..	..	2	..	..	..	2
Dysentery (Bacillary)	*	..	2(2)	..	5(4)	..	..	..	7
Encephalitis Lethargica	..	..	..	..	..	..	..	..	..
Erysipelas	*	*	*	..	*	*	..	..	..
Filariasis	*	..	..	..	..	..	..	..	..
Helminthiasis	*	..	*	*	*	*	*	*	..
Hydatid	*	1	*	*	..	*	*	..	1
Influenza	*	*	*	..	*	*	..	*	..
Lead Poisoning	*	*	*	*	*	*	*	*	..
Leprosy	..	..	..	..	..	..	..	..	..
Malaria(b)	*	1(1)	..	..	..	..	..	..	1
Measles	*	*	*	209(120)	*	*	..	2	211
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	7(3)	1	..	16(15)	2(2)	..	..	..	26
Psittacosis	*	..	*	..	*	*	*	*	..
Puerperal Fever	..	..	1	..	..	..	..	..	1
Rubella(c)	*	*	*	*	..	*	..	2	2
Scarlet Fever	23(14)	19(11)	3(2)	10(9)	3(3)	3	..	..	61
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	*	1	..	*	*	*	*	*	1
Trachoma	*	..	*	*	*	*	*	*	..
Tuberculosis(d)	17(14)	17(9)	9(4)	10(9)	7(6)	5(1)	..	..	65
Typhoid Fever(e)	..	..	..	1(1)	..	..	..	..	1
Typhus (Endemic)(f)	1	..	6	..	..	..	..	..	7
Undulant Fever	..	..	..	..	1	..	..	..	1
Weil's Disease(g)	*	*	7	*	*	*	*	*	7
Whooping Cough	*	*	*	.	*	*	..	..	..
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] The form of this table is taken from the *Official Year Book of the Commonwealth of Australia,* Number 37, 1946–1947. *Figures in parentheses are those for the metropolitan area.*

[2] *Figures not available.*

[3] Figures incomplete owing to absence of returns from the *Northern Territory.*

* Not notifiable.

(a) Includes Mossman and Sarina fevers. (b) Mainly relapses among servicemen infected overseas. (c) Notifiable disease in Queensland in females aged over fourteen years. (d) *Includes all forms.* (e) Includes enteric fever, paratyphoid fevers and other Salmonella infections. (f) Includes scrub, murine and tick typhus. (g) Includes leptospiroses, Weil' and para-Weil's disease.

Martin, Kelvin Sylvester, M.B., B.S., 1950 (Univ. Sydney), Western Suburbs Hospital, Croydon.
Morgan, Edward Hunter, M.B., B.S., 1950 (Univ. Sydney), St. George District Hospital, Kogarah.
Pearson, Ronald Willis, M.B., 1950 (Univ. Sydney), District Hospital, Manly.
Twomey, Brian Maynard, M.B., B.S., 1950 (Univ. Sydney), Base Hospital, Wagga Wagga.
White, Dennis Howard, M.B., 1950 (Univ. Sydney), District Hospital, Auburn.
Wilson, Lionel Leopold, M.B., 1950 (Univ. Sydney), District Hospital, Balmain.

The following additional qualifications have been registered:

Larbalestier, Peter Senis, 279 Maroubra Road, Maroubra (M.B., B.S., 1945, Univ. Sydney), D.D.R., 1950 (Univ. Sydney).
McKell, James, 1214 Pacific Highway, Pymble (M.B., B.S., 1942, Univ. Sydney), D.D.R., 1950 (Univ. Sydney).
Pullen, Wallace James, 135 Macquarie Street, Sydney (M.B., B.S., 1939, Univ. Sydney), M.S., 1947 (Univ. Sydney), F.R.A.C.S., 1947, F.R.C.S. (England), 1948.

Congresses.

FIRST INTERNATIONAL CONGRESS OF INTERNAL MEDICINE.

THE First International Congress of Internal Medicine will be held in Paris from September 11 to 14, 1950. The President of the congress is Professor A. Lemierre, 3, rue Rabelais, Paris-8e, France.

Nominations and Elections.

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Niedzinski, Josef, registered in accordance with Section 17(1) (c) of the *Medical Practitioners Act*, 1938-1945, 79 Ocean Street, Woollahra.

The undermentioned have been elected as members of the New South Wales Branch of the British Medical Association:

Bishop, Peter, M.B., B.S., 1950 (Univ. Sydney), Sydney Hospital, Sydney.
Black, Margaret, M.B., B.S., 1939 (Univ. Sydney), 167 John Street, Singleton.
Black, Michael James Morrison, M.B., 1941 (Univ. Sydney), 167 John Street, Singleton.
Flynn, Helen Patricia Livingstone, M.B., B.S., 1948 (Univ. Sydney), Royal Alexandra Hospital for Children, Camperdown.
Martin, Kelvin Sylvester, M.B., B.S., 1950 (Univ. Sydney), Western Suburbs Hospital, Croydon.
Maybloom, Bernard Laurence, M.B., B.S., 1950 (Univ. Sydney), 52 Palmer Street, Rose Bay North.
Mickler, Morris, M.B., B.S., 1921 (Univ. Durham), c.o. Post Office, Forster.
Skalla, John, M.B., B.S., 1950 (Univ. Sydney), Sydney Hospital, Sydney.
Webster, Zena Barber, M.B., B.S., 1948 (Univ. Sydney), 2 Ainslie Street, Kingsford.
White, Dennis Howard, M.B., B.S., 1950 (Univ. Sydney), 22 Woodward Avenue, Strathfield.

Medical Appointments.

Dr. C. R. Boyce has been appointed medical superintendent, Brisbane Mental Hospital, Goodna, Queensland.

Dr. J. H. B. Henderson has been appointed medical superintendent, Mental Hospital, Toowoomba, Queensland.

Dr. J. A. Hede has been appointed deputy medical superintendent, Mental Hospital, Toowoomba, Queensland.

Dr. G. W. Macartney has been appointed assessor with the Medical Assessment Tribunal in pursuance of the provisions of *The Medical Acts*, 1939 *to* 1948, of Queensland.

Dr. H. J. Ellis has been appointed resident anæsthetist at the Royal Adelaide Hospital, Adelaide.

Royal Australasian College of Surgeons.

OPEN MEETING.

A SPECIAL MEETING of the Royal Australasian College of Surgeons will be held on Wednesday, September 6, 1950, in the Stawell Hall of The Royal Australasian College of Physicians, 145 Macquarie Street, Sydney, at 8.15 p.m. The subject will be "Tumours of the Pharynx", and the speakers, Dr. Stephen Suggit, of Brisbane, and Dr. Harold J. Ham, of Sydney. This meeting is open to all members of the medical profession.

Diary for the Month.

AUG. 31.—New South Wales Branch, B.M.A.: Branch Meeting.
AUG. 31.—South Australian Branch, B.M.A.: Branch Meeting, E. C. Stirling Lecture.
SEPT. 1.—Queensland Branch, B.M.A.: Branch Meeting.
SEPT. 5.—New South Wales Branch, B.M.A.: Organization and Science Committee.
SEPT. 6.—Victorian Branch, B.M.A.: Branch Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney)—All contract practice appointments in New South Wales.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federal Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178 North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205 Saint George's Terrace, Perth): Norseman Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Editorial Notices.

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